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*A Fawcett Magazine*

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*185 MPH Lightplane*
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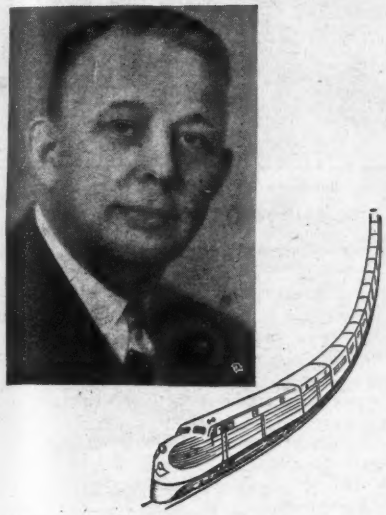

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MAY, 1946

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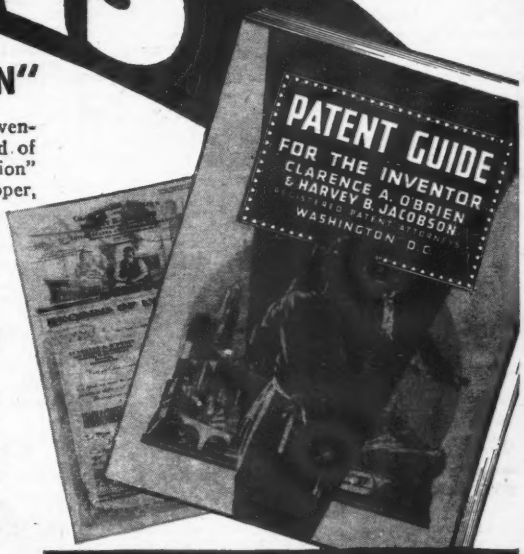


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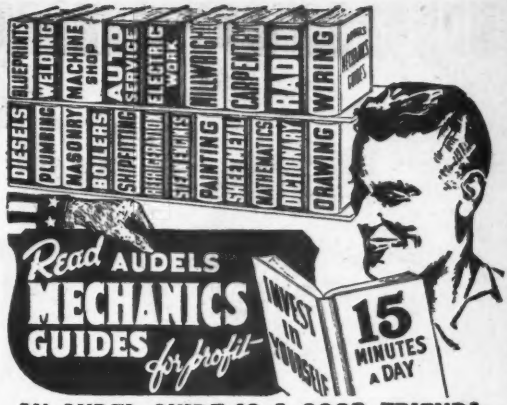


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## Phone Switching System

Donald R. Hoglund, Minneapolis, Minn., has designed a system with which it might be possible to get the operator at any time, disconnect the bell ringer, minimize wrong number dialing, etc. He wants our advice.

ANSWER: *Assume that all of the claims you make for the dial switching arrangement for telephones are precisely what you expect them to be. There is no reason, of course, why such a switching arrangement could not be built with proper design and careful construction. Now you have the gadget and you are ready to show it to the telephone companies. But suppose none of the companies are interested, what then?*

*Telephone companies require instruments that will stand hard use. We are extremely doubtful that your instrument could do so. Furthermore, telephone companies do not like to have disconnecting devices on their telephones. They want the phone to ring and expect people to answer it. Again, most companies are not at all mindful of wrong numbers. If you dial a wrong number, that is just too bad. But you pay for the call. Inaccurate or faulty dialing on your part should be paid for by you and not by the telephone company which renders the service.*

*The end result of the entire construction is that your efforts would be entirely wasted primarily because it is unlikely that any phone company would introduce this system. We consequently advise strongly against further action.*

## Single Use Toothpaste Tube

Albert M. Cola, Cleveland, Ohio, suggests that toothpaste be put up in small single unit containers.

ANSWER: *Unfortunately the suggestion for putting toothpaste in one-shot capsules is not a new idea, nor is it patentable.*

*Prior to the war the writer saw some of these capsules which were designed for but a single use. They contained, among other things, units for single delivery of such things as eye drops, burn ointment, mustard, catsup, hair oil, hair tonic, vanishing cream, make-up cream, anti-perspiration cream, foot ointment, toothpaste, and a host of others. No action is advised.*

## Camera Film Advance

Joe R. Chrisman, Manhattan, Kansas, states that he has designed a system for automatically advancing film on an ordinary camera. He wants to know if the idea is worthwhile.

ANSWER: *It is perfectly possible to make a gadget to fit an ordinary camera so that after the picture is snapped a new area of the film will be moved into position. The average camera operates by rotating a small thumb screw or key. However, you do not make the same number of revolutions of this thumb screw for picture one that you would for picture eight. Hence, any rotating device operated by a spring, also would have to have an automatic advance so that you would not waste film or overlap negatives. This is where you will run into very serious difficulties and designing problems.*

*Now, if you can lick this situation by means of a simple gadget which could be produced economically and which would fit the average hand camera, you will have a valuable invention which should be patented and for which you might find a ready market. But the whole stunt is not as simple as it sounds at first.*

## Trisecting an Angle

M. A. Wimberley, Sherman Oaks, California, submits a method for trisecting an angle geometrically. He wants our opinion of its value.

ANSWER: *We cannot get involved in any discussions concerning the mathematical accuracies of theories revolving around the age-old trisection problem. However, we were glad to get your printed brochure on this topic.*

*You state that your system will work on angles of less than 90°. Why? If there is any method of trisecting an angle it should work equally well on an angle of 160° or 200°.*

*It would appear to us that if any geometrical proof is worth its salt it must function in every case regardless of size.*

*But perhaps we didn't set up the construction correctly. Try it again yourself and use an angle of 160° and also one of 200°, then let us know if you still think that your method is workable.*

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## Fawcett Aviation Award

Fred E. Weick, right, vice-president of the Engineering and Research Corporation, is presented with a check for $1,000 and the 1945 Fawcett Aviation Award by Robert Hertzberg, executive editor of MECHANIX ILLUSTRATED magazine, at a recent ceremony held in New York City.

Weick was presented the award in recognition of his development of a spinproof, stallproof, all-safety, dual-control light plane that is as easy to fly as driving the average automobile.

The Board of Judges which selected Weick as the man making the most significant contribution to aviation during 1945 was composed of Captain Eddie Rickenbacker, president and general manager of Eastern Airlines; William R. Enyart, head of the National Aeronautic Association; Major Al Williams, outstanding American aviation figure; Casey Jones, famed flying expert; W. H. Fawcett, Jr., president, representing Fawcett Publications; and Robert Hertzberg, executive editor of MI.

The Fawcett Aviation Award is presented annually to the person making the greatest scientific contribution toward the advancement of aviation. Previous award winners have been Edward C. Wells, chief engineer of Boeing Aircraft, and Igor Sikorsky, famous plane and helicopter designer.

## High School Photo Contest

High school students, here is your chance to win part of the $3,000 that Eastman Kodak is going to distribute for the best pictures taken by high school students. There will be 318 awards with a first prize of $500. Any snapshot taken by a high school student since April 1, 1945, is eligible. The contest closes May 15, 1946. You may submit as many photos as you like, but be sure to accompany each snapshot with an entry blank, which are available from your own high school or photo dealer. Pictures developed and printed by the local drugstore or photo finisher stand the same chance of winning as those made by the fan with his own darkroom. Photos (don't forget the entry blank) should be mailed to the National High School Photographic Awards, 343 State Street, Rochester 4, N. Y.

## COMING NEXT MONTH

### Picking a Camera

Look for an interesting and informative discussion by MI's Photo Editor on cameras and how to choose the one best suited for your needs. The article will name names and quote prices. Eastman, Ansco, Argus, Graflex and others—they'll all be there!

### Color Photo Fans

Now is the time to get set for MI's third Color Photo Contest. Look for the complete details to be announced in next month's issue.

**MI KAYAK**

**William Markhoff of Trenton, New Jersey, constructed the above kayak "Sad Sack" from MI plans at a cost of less than seven dollars. To Willie goes a $5.00 Workbench Award and a Certificate of Merit for his fine project.**

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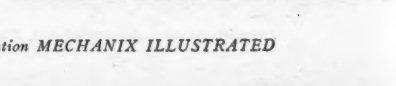

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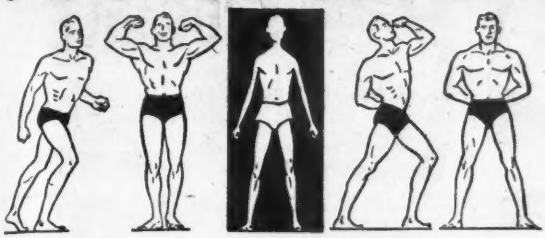

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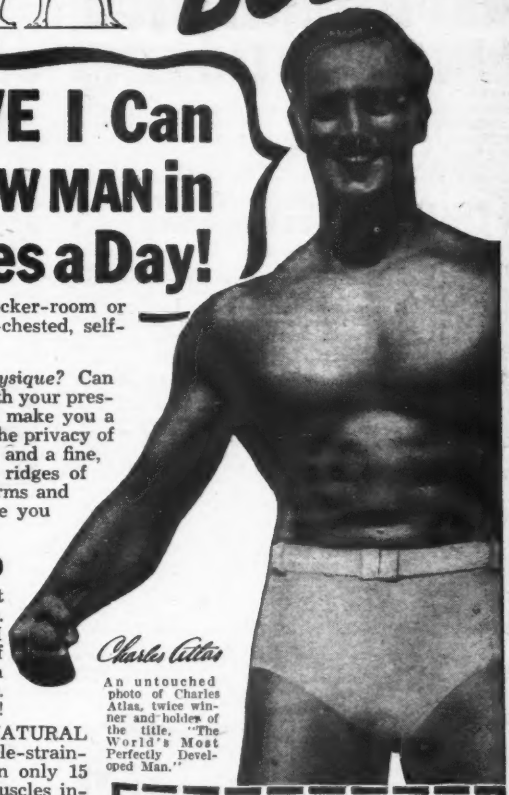

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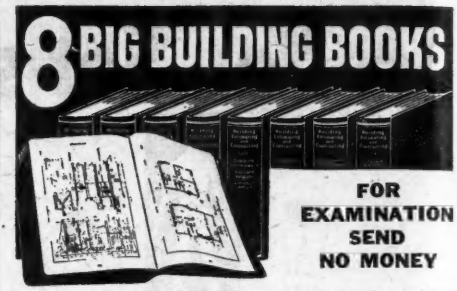

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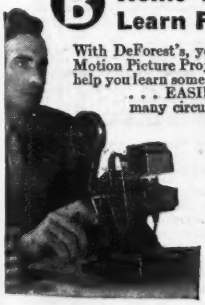

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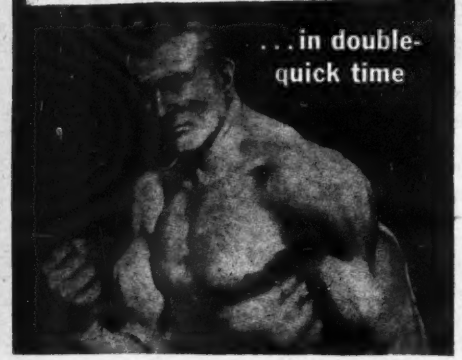

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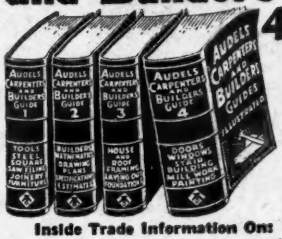

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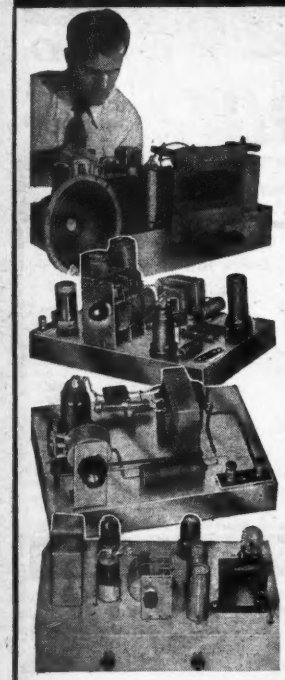

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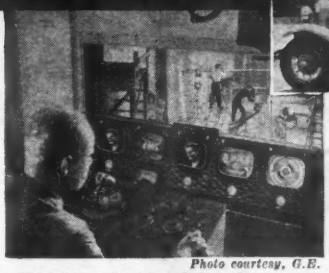

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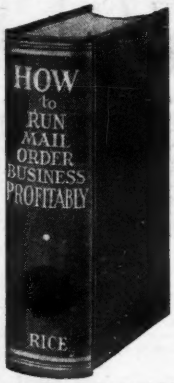


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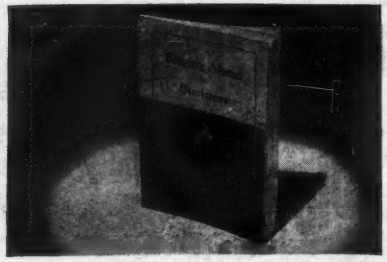

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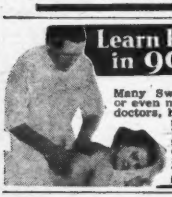

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This valuable book covers locating your shop, contains drawings of how to build and wire work-benches, where and how to advertise, what to charge, how to hire solicitors, etc. Let's hear from you, TODAY.

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Here's a great, uncrowded expanding field with an almost unlimited horizon. There's not only a big shortage of trained service and installation mechanics RIGHT NOW . . but the electrification of new areas, the big home-building boom ahead, and new uses for refrigeration and air-conditioning units should almost double the MONEY-MAKING POSSIBILITIES. Modern housewives now want DEEP FREEZE units *besides* regular refrigerators . . . and even automobiles are installing air-conditioning. So homes, farms, stores, cafes, theatres, buildings and even motorists are all prospects . . . for repairs, sales of units, parts or installation, OPPORTUNITY IS WIDE OPEN.

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WANT TO Sell? Buy? Swap? Need agents? Help? Run ad in Classified section of The American Freeman, Box 4003, Girard, Kan. Send 25c for three month trial subscription.

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ADVERTISER: 24 WORDS, 40 newspapers $3.50. List Free. Advertising Bureau, 4515-B Cottage Grove, Chicago 15.

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SILVER PLATING Liquid. (NuSilver and Replateo Trade Marks.) Apply with a cloth. Simply rub-on with a saturated cloth, dry-off and buff-up bright with a dry soft polishing cloth. All done in 1 minute. It cleans, silverplates and polishes from the one application. Easily done at home or in the office by anyone. NuSilver Plating Liquid is a more than 50% (½ plus) genuine U. S. Government Treasury Department Domestic Silver solution, 1000 Fine (pure Silver), Sterling. It renews all Sterling and plated silverware. It also silverplates onto brass, copper, bronze, zinc, nickel-silver, german-silver, and some other composition metals. Over 100 uses listed to date. NuSilver is a permanent lasting finish. Won't wash off. Won't brush off. Won't boil off. Once applied as directed it is there to stay. NuSilver Plating Liquid is a widespread and intensive seller. Working sales distributors are wanted for areas not now being worked. Easily sold to merchants in dozen lots and up by a sales set-up which furnishes free printed guarantees, printed advertising leaflets and one store counter display card for each one dozen bottles. Any kind of a store or business place can sell NuSilver. Any kind of an average distributor-Salesman can sell NuSilver. You sell, deliver and collect your big profits in cash each day as you work. Details by letter-mail. For U.S.A. Territory only. Can sell both wholesale and retail, and to jobbers or any way you like. We also have a companion product, the Lectrik Silver Kleaner Atomic Metal Plate (catalytic principle). Cleans silverware fast. Simply dip, rinse and rub-up dry. Has detarnished and cleaned as many as 100 pieces per minute. A really sensational demonstrating product. Strictly a "must" product for Eating Places of all kinds with lots of tableware to be de-tarnished and cleaned daily. These two products together are making a lot of profits for hustling distributors now. This is not a dream but a reality now. Do you want to get hold of two money making products like these as a distributor for your territory? If so write us for complete details and let's see if we can get together. Simply address: NuProcess Products Laboratories, Dept. 218, Aurora, Ill.

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WOULD YOU pay 9%—first $350 made? Color-illustrated book "505 Odd And Successful Enterprises" free! Proven by "Little Fellows." Some plans offer occasional "day off"—others: busy days. Start business; home, office. Pacific, 262 Drake, New Rochelle, N. Y.

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AGENTS WANTED. Sell Sunglasses Wholesale and Retail. Very Attractive Commission. Paramount Sunglass Co., 1133 Broadway, New York 10, N. Y.

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WAR HONOR Scroll. All branches service. 12 by 16. Veterans make big money. Sample 25 cents. Truly beautiful. Condon, Upper Darby, Penna.

GREETING CARD moneymakers. Birthday, Everyday, Motherday. Write Greenport Art Company, Dept. N-252, 12th Street, Brooklyn 15, N. Y.

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**LIQUID MARBLE;** snow-white, multi-colored. Glazed. Unglazed. Composition Flooring. Lifetime wear. Any color. No priorities. Flexible molds. Plaster casting. Get into the big money now. Full information given free. Write—Compo-Tex, Box 786-D, St. Louis, Mo.

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**COLOR-ILLUSTRATED BOOK** "505 Odd And Successful Enterprises" free! Several hundred dollars monthly reported (exceptional)! Some plans offer occasional "day off"—others: busy, full days; at home, office. Pacific, 262 Drake, New Rochelle, N. Y.

**THARS GOLD In Them Thar Hills.** Panning gold is fun, healthy and profitable. New 160 page beginners book explains modern methods. Book and three large blueprints on small equipment $3.00. Free literature. Old Prospector, Box 21-R2, Dutch Flat, Calif.

**WHAT MAKES** you think you couldn't sell by mail? We're doing it happily! New! Different! Exclusive! Alive with money-making opportunity. Full particulars free. Investigate! Compare! The What-To-Do Shop, Box 1082, Dept. 25, Tacoma, Wash.

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**OPERATE YOUR** own Credit-Collection Agency Business; Many Earn $5,000-$10,000 Upwards Annually; Fulltime-Lifetime Vocation; Interesting Literature Free; Write Educational Extension Service, Department 103, Los Angeles 36.

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SELL RELIGIOUS Goods by Mail! Easy to start. Big profits. Every home is your prospect. Cleveland, 243-A4 White, Clyde, Ohio.

AMAZE OTHERS. Add columns instantly. Add faster than adding machine. Free details. T. Math Institute, Box 633, Mobile 4, Ala.

200% PROFIT—PAINT and sell wall placques, in many new designs. Satisfaction guaranteed. $1 doz. up. Oehme, Round Lake, Ill.

10c BRINGS YOU lots of mail. Catalogs, magazines, money making ideas, samples. Gardenville Publishers, Gardenville 19, N. Y.

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"WHOLESALE CATALOG and Directory 10c" (refundable). Thousands of articles. Stafford, Sunnyside-Z, Indianapolis, 44, Ind.

START OWN Business—home, office; booklet describing "137 Business Plans" free. Elite Co., 220-G Grand Street, New York 13, N. Y.

PLASTICS. I'LL show you how to get some real money. Free details. Write Anderson, 311M George St., Toronto, Canada, Today.

MAKE BIG Money. Exceptional Opportunities. Real Money Makers. Free Particulars. Turner, 5675-C Lannoo, Detroit, Mich.

QUICK MONEY. "Repairing car Batteries". At home. Easy to. Write Batteryman, 901 South Avenue, Grand Junction 2, Colo.

SELL CLASSIFIED mailing lists to mail order companys. Big profits. Details free. Edward Lamb, Box 60, Struthers, Ohio.

MAKE BIG Money buying goods for others, as well as yourself, at wholesale. We show you how. Jerry Bond, Mounds 2, Okla.

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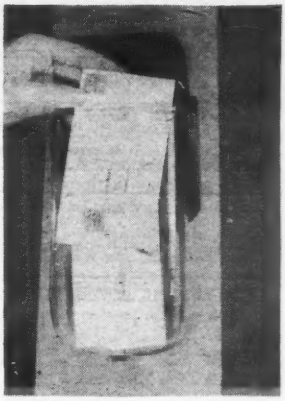
## Transparent Letter Box



Above is a new type mail box whose contents can be seen without going outdoors. It is made of heavy crystal glass to withstand hard use, mounted on a strong plywood support that is specially treated against moisture, termites and rotting. The cover is of the same plywood, having a weather resistant lacquer finish, can easily be fastened to a wall or any convenient spot.

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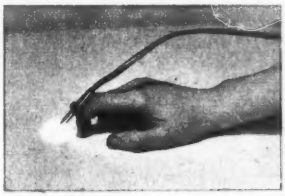

Of especial interest to mechanics, inspectors and workshoppers is this new light which clips onto the finger or can be attached to various types of tools for working in small spaces. Its greatest virtue is that it allows full use of the hand and at the same time affords ideal illumination.

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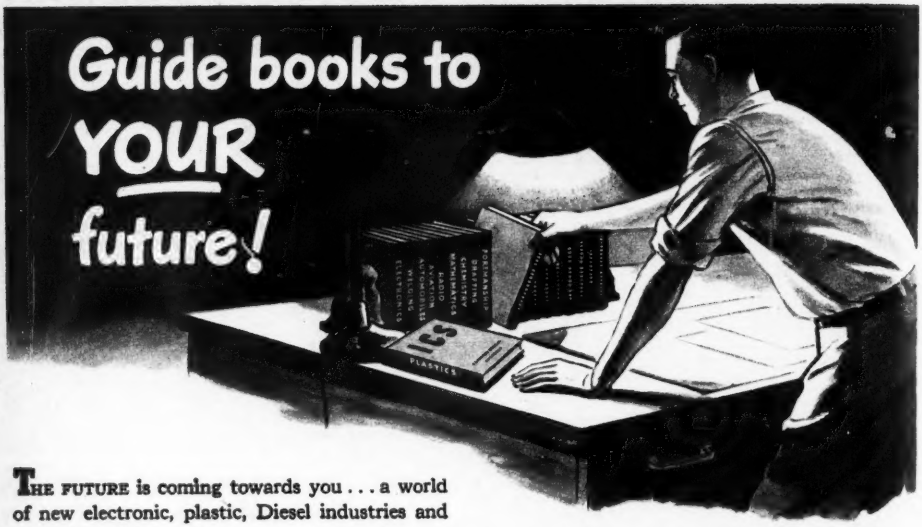


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# They Fight FIRE With FIRE

BY NORMAN CARLISLE

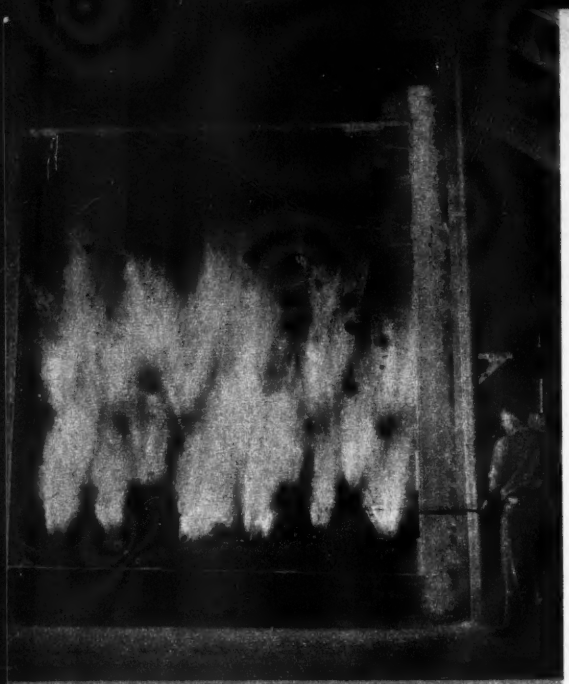
**An unusual business, this—starting fires to stop them, and cracking safes to stop safe-cracking.**

ROARING flames licked hungrily at the factory window. In the weird yellow light, grotesque figures stood and watched the angry fire crackle up and down the glass. They didn't rush for extinguishers. No one stirred to turn in an alarm. These men waited calmly for the fire to do its worst.

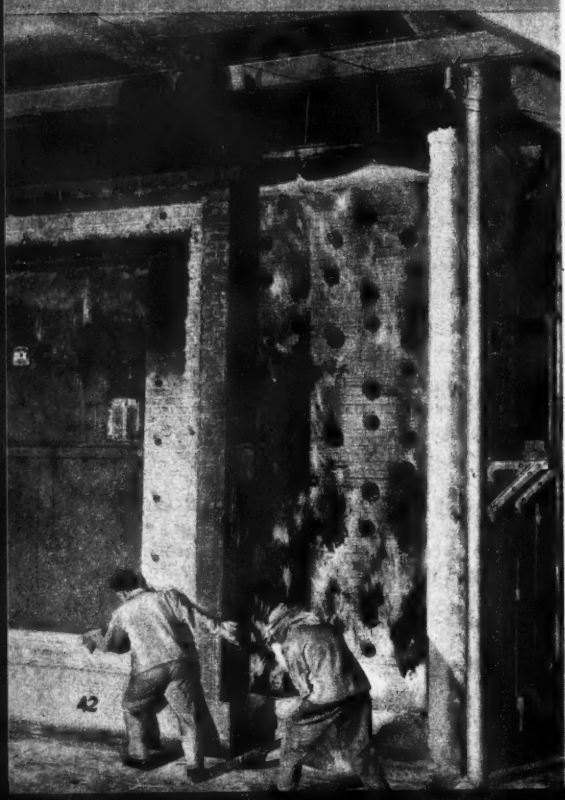
The temperature climbed higher and higher, until it reached the incredible intensity of 1640 degrees, eight times hotter than scalding water. Could any glass stand the terrific heat?

Satisfied finally that the fire was powerless to crack the window, the watchers dragged out a fire hose and sent a stream of water under thirty-five pounds of pressure smashing against its fiery, red-hot surface. Surely it would break now. Hissing clouds of steam hid the glass from sight. Protected against flying glass splinters by their costumes, the men waited for the sound of shattering that would tell them the glass had given way. But no sound came. The wired-glass steel-framed window was still whole. It had passed the test with flying colors.

That glass won the U.L., INSP stamp.



A metal elevator door and the fiery vertical oven where it must undergo a temperature of 2,000 degrees for four hours, followed by a drenching with water.



That tiny stamp in the corner – Underwriters' Laboratories, Inspected–means safety, for Underwriters' Laboratories plays with fire to keep you from getting burned.

This is just one of the countless tests being made constantly in the astonishing laboratories where men are always engaged in arson, safe cracking, and industrial sabotage.

The business of preventing fires by starting them began on a minute scale in 1893, and has grown to embrace three large laboratories, in Chicago, New York and San Francisco, and a fourth in Illinois where the dangerous work of testing nitroglycerine is done. Two hundred inspection offices dot this country and Canada and reach across both oceans to London and Hawaii.

The laboratories have a widely-varied test program. Photographic film, automobiles, electric signs, bullet-proof glass, tear gas systems, elevators – name anything even remotely connected with safety and you will find that Underwriters' Labs has been testing it for years. Protection is its keyword, and no one can even guess at how many lives and how much property it has saved in its brief life of fifty years.

U.L. has no authority to demand that products be sent in for testing. Yet they are swamped with them, and thirty-five hundred businessmen are regular subscribers to the service. To date they have submitted over two hundred thousand articles! The astounding number of five hundred million labels has gone out of the Underwriters' Laboratories to spell safety to the consumer.

The activities of the Laboratories hold great promise for a more comfortable, safer postwar world. Thinking up the right test for the new product is no

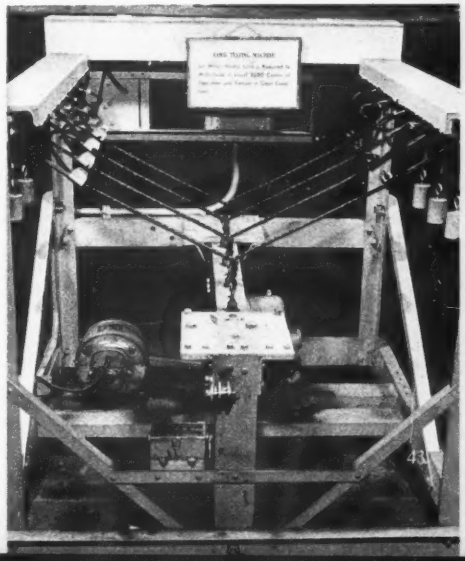
**Three closely-placed bullets have failed to penetrate in this bullet-proof glass test.**

**Floor wax and varnish can be too slippery. This friction tester helps keep you right side up.**

problem to the technicians of the Laboratories.

Take a look at the electric heater test, for instance. The electric heater cord has already been tested by running excess current through it, and by twisting it several thousand times in a machine made especially for that purpose. Now it's plugged in. Two layers of cheesecloth are tossed over the guard. The cloth blackens, chars through—but no flame rises from it. That cheesecloth represents the curtains in your home which may easily blow across the face of such a heater, or the clothing of a child standing too close. Now they're putting the heater as close as possible to a pine board wall. They'll leave it on for an hour. If there is still no flame, or no embers, the heater will win that coveted tag which will certify it safe for use in your home.

Here is what one Underwriters' Laboratories'-approved electric iron did. A housewife went on a vacation, leaving it plugged in. When she came home two weeks later, the iron had charred its way through the ironing board, through the floor, and was dangling into the cellar as far as its cord would reach. Yet it hadn't set anything afire—because it couldn't, thanks to U.L. testing. Waffle irons, coffee makers, toasters, mangles, electric stoves and other electrical household appliances go through this series of rigorous tests. Half the products submitted for testing are rejected. Usually the manufacturers take their rejected products

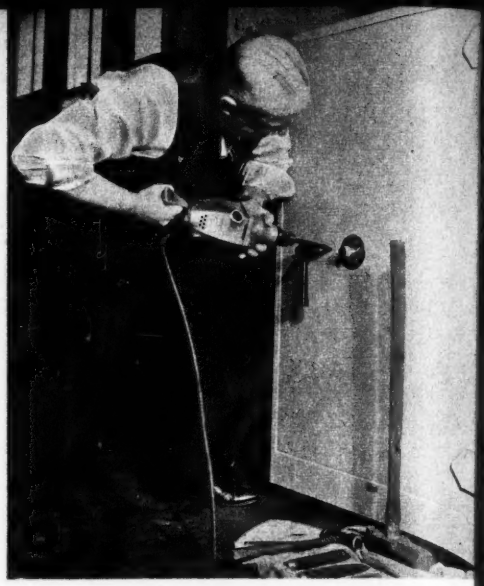


**Heater cords for electric appliances are twisted and untwisted 3,000 times —and must remain in good condition.**

back, redesign them, and submit them again. About half of them are redesigned to the satisfaction of the U.L. men.

A danger spot in your home is the roof. Watch one of the engineers testing roofing materials. A carpenter has built a framework of pine, resembling a roof construction. The roofing to be tested is nailed on. Now a smaller framework is set afire, tossed onto the roof, just as a burning brand from the house next door might fall on your roof. A nearby wind tunnel stirs up a stiff breeze, helping the test along. If the brand burns itself out before the fire reaches the pine sheathing beneath the roofing, the material gets the Laboratories' O.K.

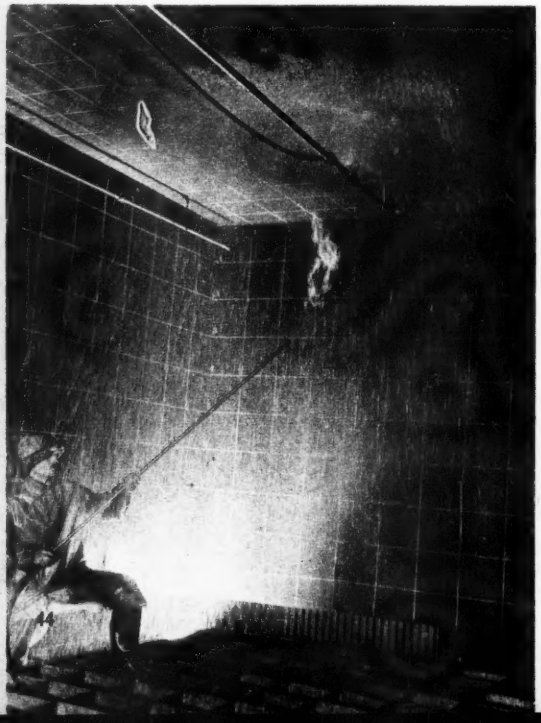
Radios, vacuum cleaners, incubators for babies, electric blankets and heating pads, permanent wave machines, dishwashing machines, films and projectors, oil burners, even motor-powered toothbrushes—all come under the rigid scrutiny of the uncompromising Laboratories' men.



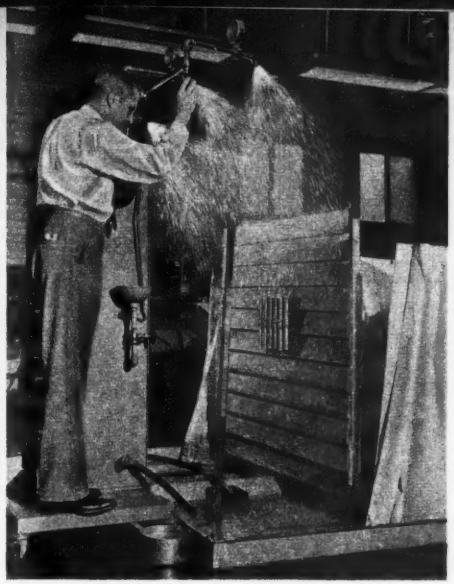
Cracking a big safe, to find out how well it resists. Note the heavy "can-opening" tools.

Besides protecting your home, U.L. men work closely with fire departments to keep you safe in office buildings, schools, hotels and theaters. Here are the focal spots of fire and frightful loss of life, the breeding places of disaster. Because of these men, a tragedy like that at Collinwood, Ohio, in 1908, need never happen again. It was in the Lakeview school there that fire broke out. In orderly, unpanicked procession, the children were marched to the doors—doors that were locked! Three teachers and 173 children were burned or crushed to death in that fire. Now "panic bolts," which must open when fifty pounds of pressure are applied, make such doors safe.

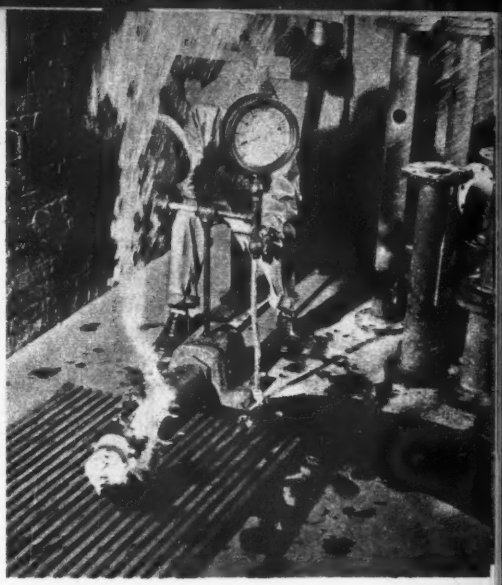
U.L. engineers survey entire cities, checking on the reliability of the water supply and hydrants, testing automatic sprinklers and other equipment. They consider the number of fire companies and their location, the condition of their equipment and their methods. They examine the structural condition of buildings, the fire alarm system, special or unusual hazards, the building laws, and the police department. These surveys take months, but when the findings are reported to the city's officials, the sug-



An engineer has just melted the fuse of an automatic sprinkler system. The uniformity of the spray is determined by measuring the water level in the boxes.



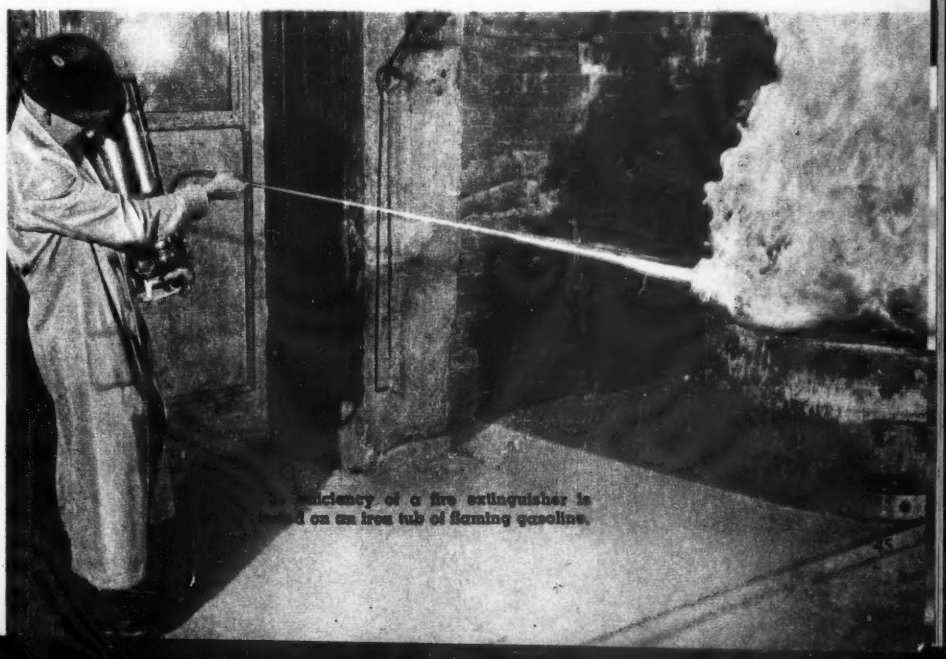
These electrical pipe fittings must receive a 12-inch-per-hour "rainfall" and remain watertight.



Bursting a length of fire department hose. It took a pressure of 875 lbs. per sq. in.

gested improvements nearly always are made.

If by any chance you are considering a life of crime, reflect for a moment on what the Underwriters' Laboratories have done to make the lives of yeggs and safecrackers uncomfortable. U.L.'s crime prevention department has the burglar licked before he starts. If the luckless bank robber finds himself confronted by a safe with a U.L. label, any one of five things can happen to discomfit him. The vault may have electric wires embedded in its walls, sounding an alarm as soon as the wires are disturbed. Or it may have microphones which pick up the noises of your attempt to break in. Or maybe you're already lost, because you've broken a beam of invisible light without knowing it. Again, [*Continued on page* 159]



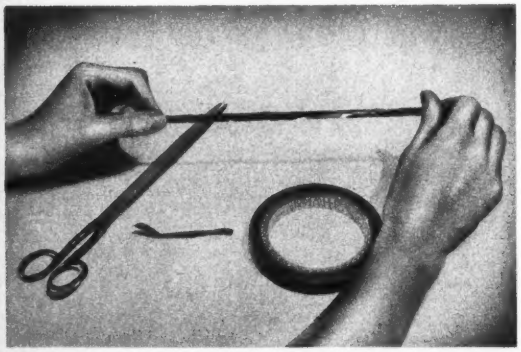
[illegible] ficiency of a fire extinguisher is [illegible]d on an iron tub of flaming gasoline.

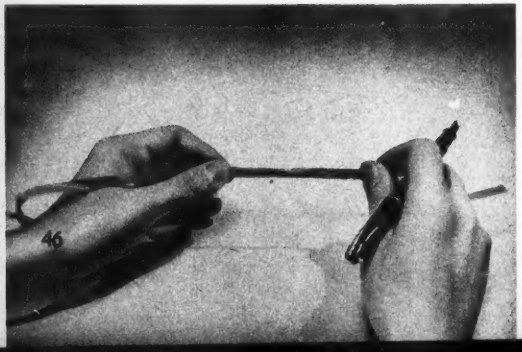
# TALKING TAPE

BY HARRY BATES

**An inexpensive metal-coated paper tape replaces the usual wire in this new home magnetic recorder.**

**The top of the cabinet contains the accessible reels with the several buttons and knobs. Editing is only a matter of cutting and pasting the tape.**





**You can write titles right on the tape, noting where the programs start and stop.**

DON'T pop the question or promise your wife that fur coat when you're near the radio, men, for it could be your fair one is catching every word with a magnetic recording attachment—so that your stutterings and promises may some day be played back into your unwilling ears.

Magnetic recording has been made really handy, efficient, cheap. A new Brush development has no tricky wire, but utilizes a paper tape with a metallic coating. One full reel makes a half-hour recording.

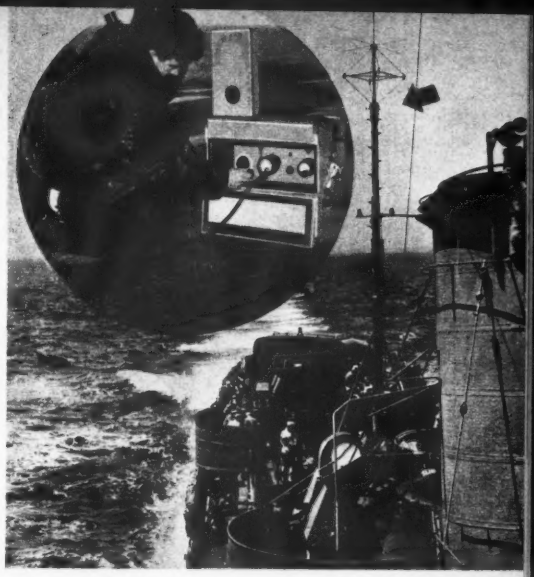
The model resembles a table-top radio receiver and can be placed anywhere nearby. Operation is very easy. You record by pushing a button. When the recording has been made you push another button which rewinds the tape. Within a minute the recording is ready for the playback.

Unwanted recordings are easily erased, so that the tape can be used over and over.

You can make any kind of recording you can think up—your own album of popular songs, Bob Hope and symphonies with the announcements cut out, the first warbles of the New Edition, the Bright Sayings of Little Junior—anything.

The tape is easy to handle. Automatic controls assure proper volume. The tone quality and fidelity are exceptionally good and operation is so simple that Little Junior can work it himself—and probably will, when your back is turned.

# HUFF-DUFF

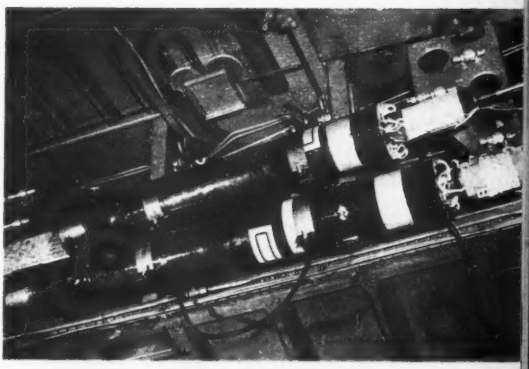


ADD another electronics network to the list previously revealed by the Navy as instrumental in driving Nazi and Japanese submarines from the Atlantic and the Pacific during the war.

This one, known officially as the HF/DF, or high frequency radio direction finders, and unofficially as "Huff-Duff," systematically searched the air waves over both oceans and provided the Navy with a day-by-day account of the movement of enemy undersea craft. The equipment was housed in stations dotting the coastline on both sides of the Atlantic and also on mid-ocean islands.

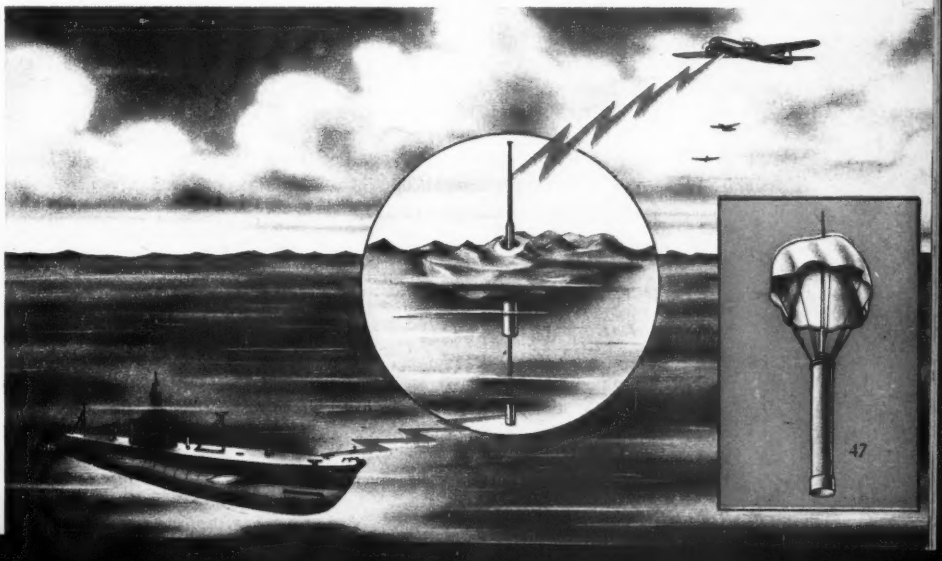
This net- [*Continued on page* 159]

# SONO-BUOY



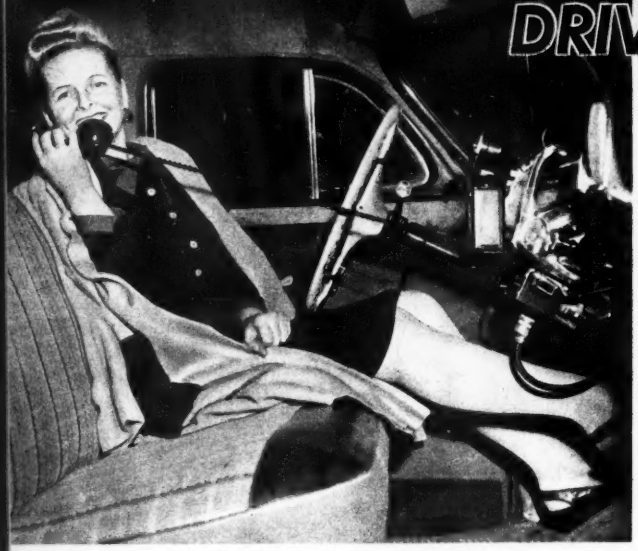
FOLLOWING closely the disclosure of the miracles of radar, including "Huff-Duff," the Navy Department has revealed the story of an amazing electronic device – the Sono-buoy – highly instrumental in whipping the Nazi submarine menace in the Atlantic, and equally effective recently against the Japs in the Pacific.

For a time after the United States entered the conflict it appeared as though the [*Continued on page* 161]



# DRIVIE-TALKIE

**Turning your car into a phone booth is the almost accomplished aim of telephone companies.**



**The young lady demonstrates the use of a car-installed dial phone at a recent showing in New York.**

YOU'RE out driving—you have to make a phone call—you stop at the nearest gas station or drug store. O.K. But you won't be *stopping* much longer. Soon now there will be available a personal phone for the dashboard of your car, with which you can call any other phone in the country, *as you drive along the road!*

This is being done right now. The ATT has had such instruments installed in company cars for some time, giving them extensive service tests. Now they plan to test the service commercially in the St. Louis area in fleets of trucks and delivery cars. The trucks and cars will be able to maintain contact with their home office for rerouting, reports on schedules and the like without the need of elaborate radio equipment in the trucking company's offices. The calls to and from their cars and trucks will come over the regular telephones already installed in the offices.

Plans then call for the early expansion of this service to private cars. Any vehicle on the highway, equipped with the mobile telephone, can either call or be called from any other phone, and this includes phones in other cars anywhere.

Operation of the new service is simple as can be. A bell sounds and a jewel button on a small switch panel lights up when a call is coming in. You simply pick up the receiver and take the call. When you talk, a button on the hand-part of the receiver and mouthpiece is pressed, switching the radio circuit in your set over to transmitting position. To listen, the button is released. That is all. Through selective signalling, only the car being called receives the signal from the operator at the switchboard.

Traffic control departments of laundries, the Railway Express, trucking outfits, both local and interstate, and the service cars of utility companies will be the largest users of this service at first, but as fast as facilities can be installed, the public will be in.

Installations will be serviced by the telephone company, for all equipment

**Transmitting and receiving apparatus of a car phone may be installed in rear of car.**

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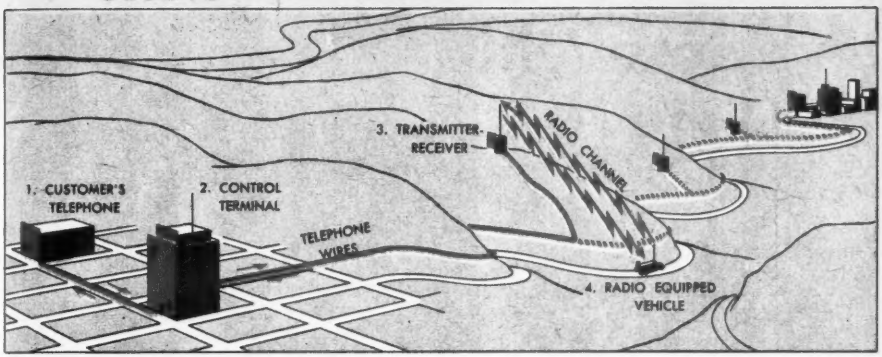



**Drawing illustrates how transmitter-receiver stations will be located and connected into regular exchanges. Vehicular messages will be relayed by these stations.**

will remain its property. You, the user, will have no more worry than with any other phones.

Western Electric is now producing a unit for urban trucking service known as the model 238-A Mobile Radio Telephone. It is very simple to install and takes up little room, particularly on the dashboard. The receiver and transmitter are mounted in any out-of-the-way location and the dash installation requires only a small switch panel that is built into a box with a holder for the handset. This first unit requires a heavy-duty battery and an oversize generator, since it draws 60 watts of current, but later models are being engineered for private cars that will have a much lower current consumption and be still more compact.

This system of tying in the phones to a mobile radio telephone service is exactly similar to the Harbor Service now in operation at various ports on the East and West Coasts. In New York, for example, most of the tug boat companies are making constant use of the service to direct their tugs to jobs all over the harbor and vicinity. Each tug or other boat using the service is equipped with a hand telephone set and can talk directly to the traffic manager in the company's office.

When you phone from your home for laundry or [*Continued on page* 161]

**This diagram shows one procedure for installing the automobile 'phone.**

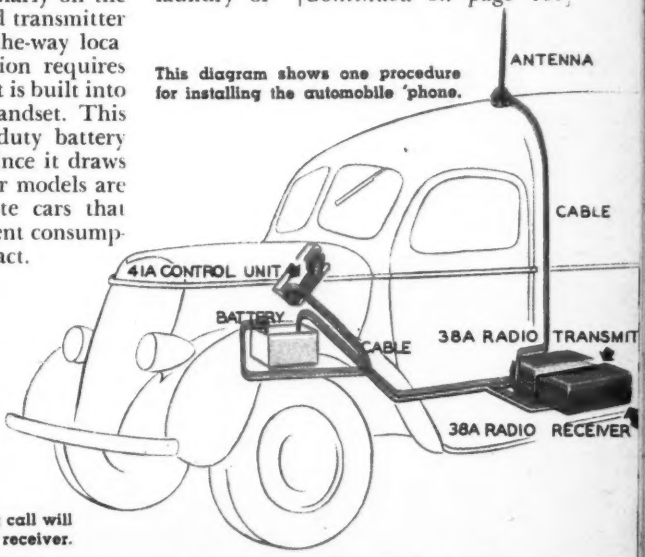
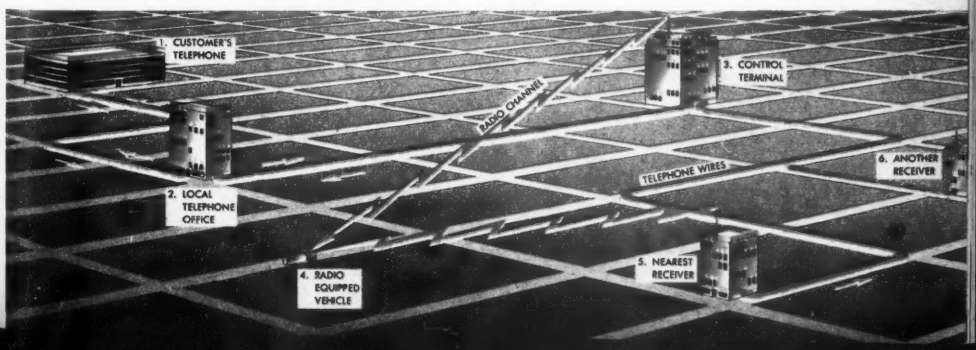


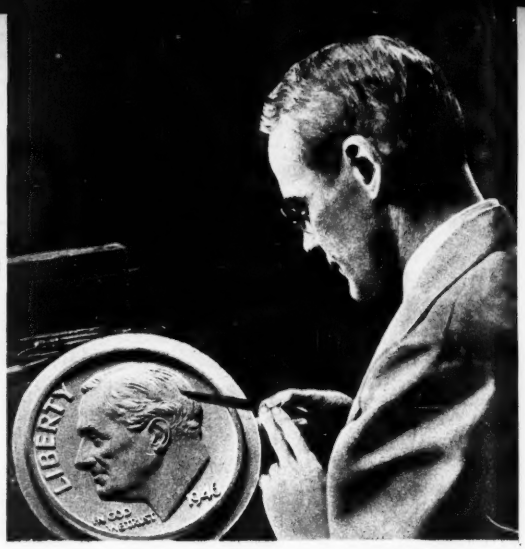

**Diagram shows how a car taking a call will transmit back through the nearest receiver.**



# The Roosevelt Dime

BY JAMES NEVIN MILLER

**There's a lot of work in making a new coin for Uncle Sam.**




John R. Sinnock, the Treasury's top-notch engraver, is shown at the right designing the new dime.

FROM now on the U.S. Mint will make only one type of ten cent piece, the Franklin D. Roosevelt dime. The coins are being released throughout the country by Federal Reserve banks and branches as well as through the cashier of the Treasury.

The ten-cent piece commemorating the late President and designed by John R. Sinnock, the Mint's chief engraver, is of exactly the same size and metallic content as the previous dime. The "head," or obverse side, bears a portrait of Mr. Roosevelt facing left; the word LIBERTY around the left border; in the lower left field IN GOD WE TRUST, and the date, 1946, in the lower right field.

The reverse side carries the torch of liberty centered with the olive branch of peace on the left, and to the right the oak branch signifying strength and independence; inscribed around the upper border is UNITED STATES OF AMERICA; around the lower border, ONE DIME; across the lower field appears E PLURIBUS UNUM.

Nellie Tayloe Ross, Mint Director, says the winged Liberty head dimes now outstanding will continue to circulate, but no more will be minted. The first ten-cent coins bearing the pattern created 30 years ago by Adolph A. Weinman, were struck in 1916. As of late December, 1945, when the last of the Liberty dimes passed through the presses, the Mint had put out a total of 2,677,232,448 of these coins.

The alloy, 90 per cent silver and 10 per cent copper, is melted and then poured into these ingot molds.

The new Roosevelt dime is the fourth portrait coin in the present series, all of which honor former presidents. The others are the Lincoln penny, the Jefferson nickel and the Washington quarter.

In all coinage operations the first step is to prepare the alloy. In the case of silver coins the alloy consists of 100

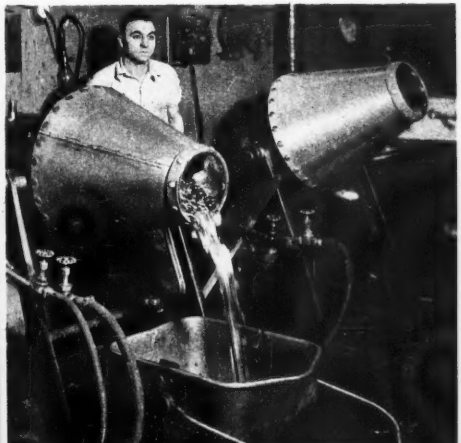
**The ingots are rolled into strips which are then fed into cutting presses like the one at the left, which produces dime-sized blanks.**

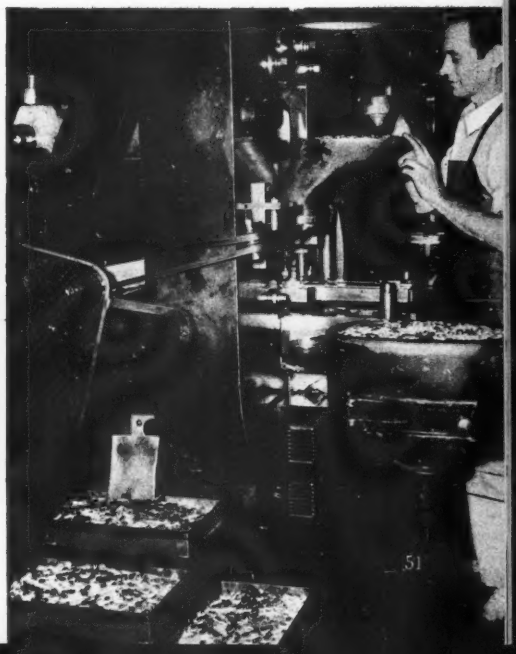
parts of copper and 900 parts of silver. The alloy is melted in electric induction furnaces and poured into molds to form ingots.

Next, the ingots are put through rolling mills and reduced to long strips of the required thickness. The strips are then fed into cutting presses which cut circular blanks of the approximate dimensions of the finished coin. The blanks are run through annealing furnaces to soften them, next through "tumbling barrels," which are rotating cylinders containing chemical solutions which clean and burnish the metal; and finally into centrifugal drying machines.

The blanks then go to the milling or "upsetting" machines, which produce the "upset" rim. Blanks for silver coins, with the exception of dimes, are again separately weighed on automatic balances, and if found outside of legal limits, are condemned and remelted. The dime, five-cent piece and one-cent blanks are not weighed separately but frequently test weights of blanks are made.

Next is the important operation of the stamping or [*Continued on page* 166]





**Blanks are washed in the tumble machine, above, to remove tarnish and dirt. At right, the stamping press where blanks go in and dimes come out.**

# MI Tests the New Cars

## PONTIAC

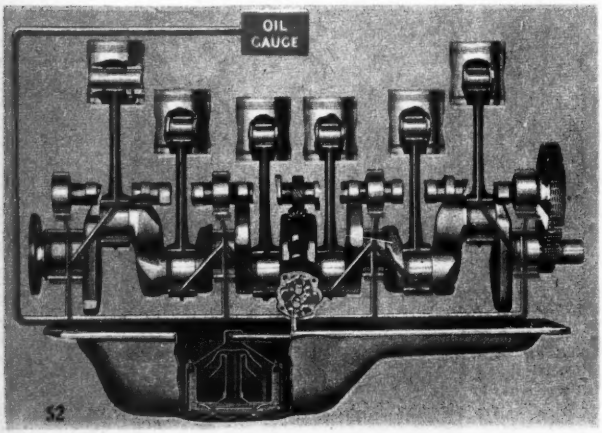
The front door hinging gets McCahill's attention. It looks fine—but don't ever squash the fender!

**Another in the series of reports on the performance of the new cars, by Tom McCahill, MI's auto consultant.**

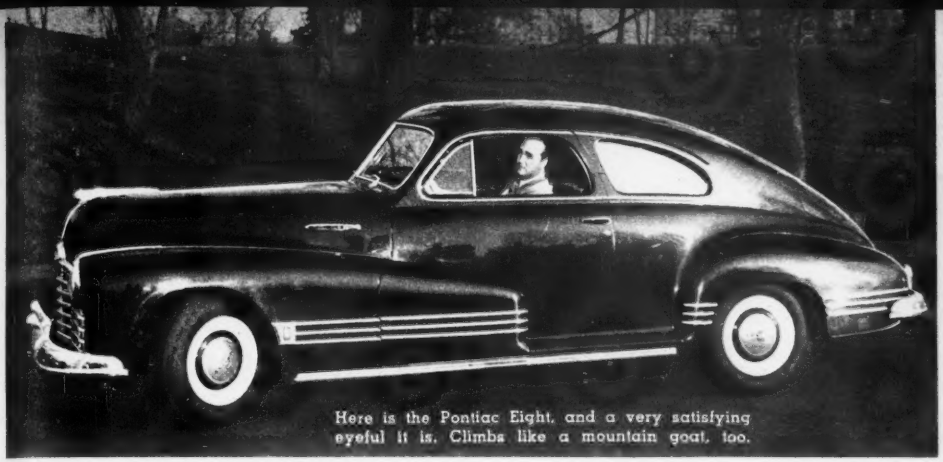
THE new Pontiac is largely a repeat performance like those of most of the major auto manufacturers. The bumpers are larger and the radiator grille has been redesigned—which adds up to about the same amount of body improvement offered by the other top-flight makers in 1946. Mechanically, too, there are few changes, all minor—so that this is the same Pontiac offered to the public nearly five years ago.

By comparison with the other cars selling in the low side of the medium-priced bracket, the 1946 Pontiac is a superior-looking car, moderately streamlined and well proportioned throughout. The lower parts of the front doors disappear as they open into the fenders, which is a trick you will admire until you trim the garage door too close or run into one of those situations where it wasn't your fault. you had the right of way. Then you might become a little annoyed if you can't get the door open because of a buckled fender, close to midships.

The car I took on a test




Cutaway view showing Pontiac pressure oil-feed via drilled connecting rods, and special oil filter in the crankcase.



Here is the Pontiac Eight, and a very satisfying eyeful it is. Climbs like a mountain goat, too.

run was the eight-cylinder model which sells for only twenty-five to fifty dollars more than the Six. My first impression was bad. I like above all things comfort in an automobile and the front seat felt as if it had been cushioned with rocks. The only thing I have ridden in that felt harder on my underside was an army jeep. Now this car was one of the first delivered to New York and the seating may have been improved, but honest reporting requires me to say it gave all the comfort of sitting on a park bench in an earthquake. I sincerely advise all Pontiac enthusiasts to give the new cars the sit-down test before going any further, unless they all happen to be cowboys.

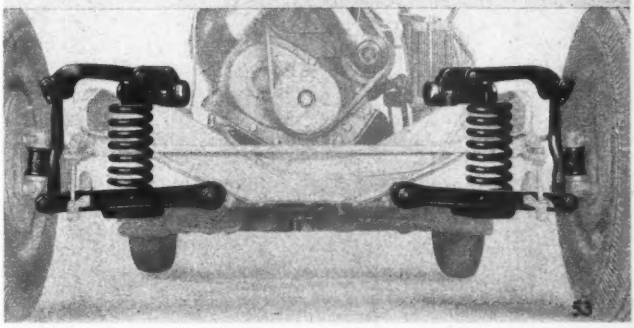
Another thing I found annoying was the way the front door handle had of sliding up my sleeve at the wrong time. The handle is mounted horizontally and the lever end runs to the back, so unless you are careful and keep your sleeve well away when turning sharply to the right, it may stop your arm, putting you in a bit of a fix. (Of course this doesn't happen with everyone, for I haven't heard of any run on the tailor shops by Pontiac owners in '42.) Two of the good points of the body interior are the dash-board, which is functional in design and uncluttered with distracting decoration, and the well-tailored appearance of the upholstery.

I found it impossible to really test the riding qualities of the car because of the seat construction.

The engine, which develops 103 horsepower, proves ample for a car of this size. In testing for pick-up ability, I first let the car slow down to less than ten miles an hour in high on a level stretch, then opened the throttle wide. It picked up nicely, though unimpressively, and I was soon doing better than fifty. Next, I tried the pick-up through all gears from a standing start. I raced the engine until I was doing close to fifteen in first, then I shot into second and held it there until I was doing more than thirty, and then I went into high. Again, I was doing better than fifty in short order. The 1946 Pontiac has pick-up and punch, though I have driven several other makes this year that had even more.

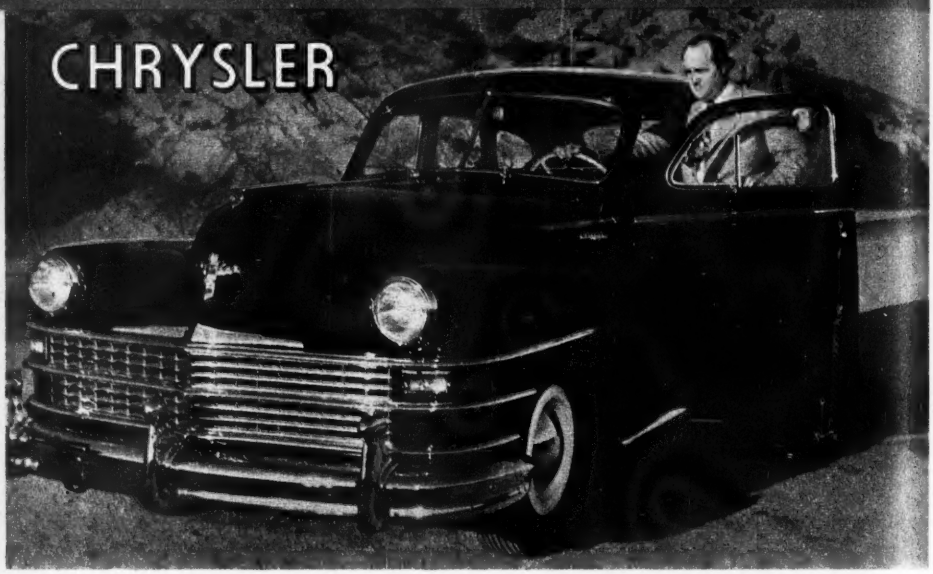
Following this I tried the car out on my favorite testing hill. I slowed down to less than ten miles an hour in high at the bottom, [*Continued on page* 72]

**This photo has been specially retouched to bring out the details of the springs and levers in the Pontiac front end suspension.**



# MI Tests the New Cars

## CHRYSLER

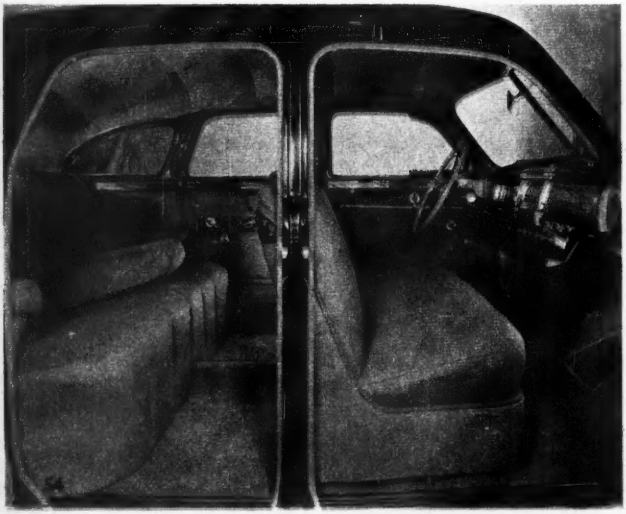


The '46 six-cylinder Chrysler Royal, at the top of Mt. Franklin. Grille and bumpers are new.

THE new Chrysler has been developed under cover and kept something of a mystery, and it was no simple matter to get one to test for you, but get and test one finally I did, down El Paso way in the fair state of Texas.

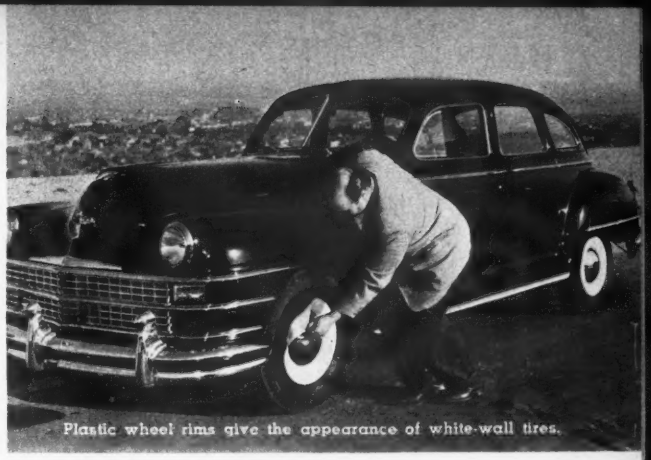
Chrysler has six models and 26 body types in its line this year. The car I snared was the six-cylinder Chrysler Royal, which is neatly in the middle of the medium-priced bracket. The Royal is a brother of two other six-cylinder models, called now, as before the war, the Windsor and Town and Country. The three have the same mechanical specifications: in fact they are practically carbon copies of each other. I personally owned a '42 Windsor, so I feel a special qualification to make pre- and post-war comparisons. I can sum up my findings very briefly by saying that the Chrysler Royal is one more post-war model which shows no major changes.

Many smaller ones have been made. There is a new grille styling. New and more massive bumpers, front and rear, now extend around the



There's class and plenty of head and leg room in the simply-styled interior.

sides of the fenders, giving added protection. Parking lights have been moved to a new position just under the headlights, and other lights have been redesigned. White plastic wheel rings give, from a distance, the appearance of white-wall tires. There is different ornamentation, heavier plating. The oil filter is new. A sway bar of simpler construction is used. The ignition coil has been transferred from the dash to a place above the distributor, and mounted to the cylinder head by means of a bracket.



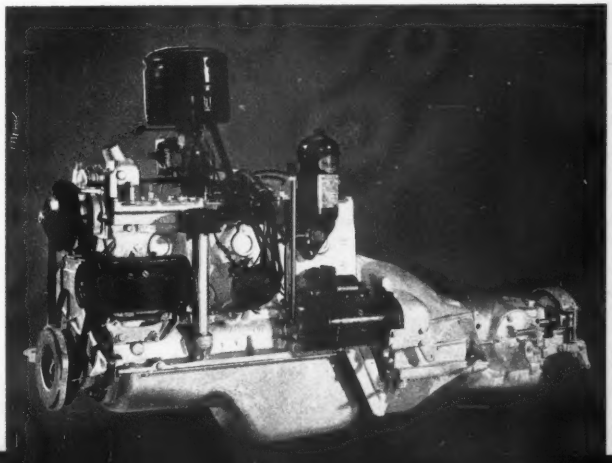
Plastic wheel rims give the appearance of white-wall tires.

My Royal, like all the 1946 models, had the Chrysler Safety Rim wheels which reduce the hazards of a blowout or sudden puncture, because it is virtually impossible for the tire to come off the rim or get into a position crosswise to the wheel while deflating. It is claimed that cars with this feature have been brought to a smooth, safe stop when tires have been exploded by a dynamite cap at speeds of over 75 miles an hour.

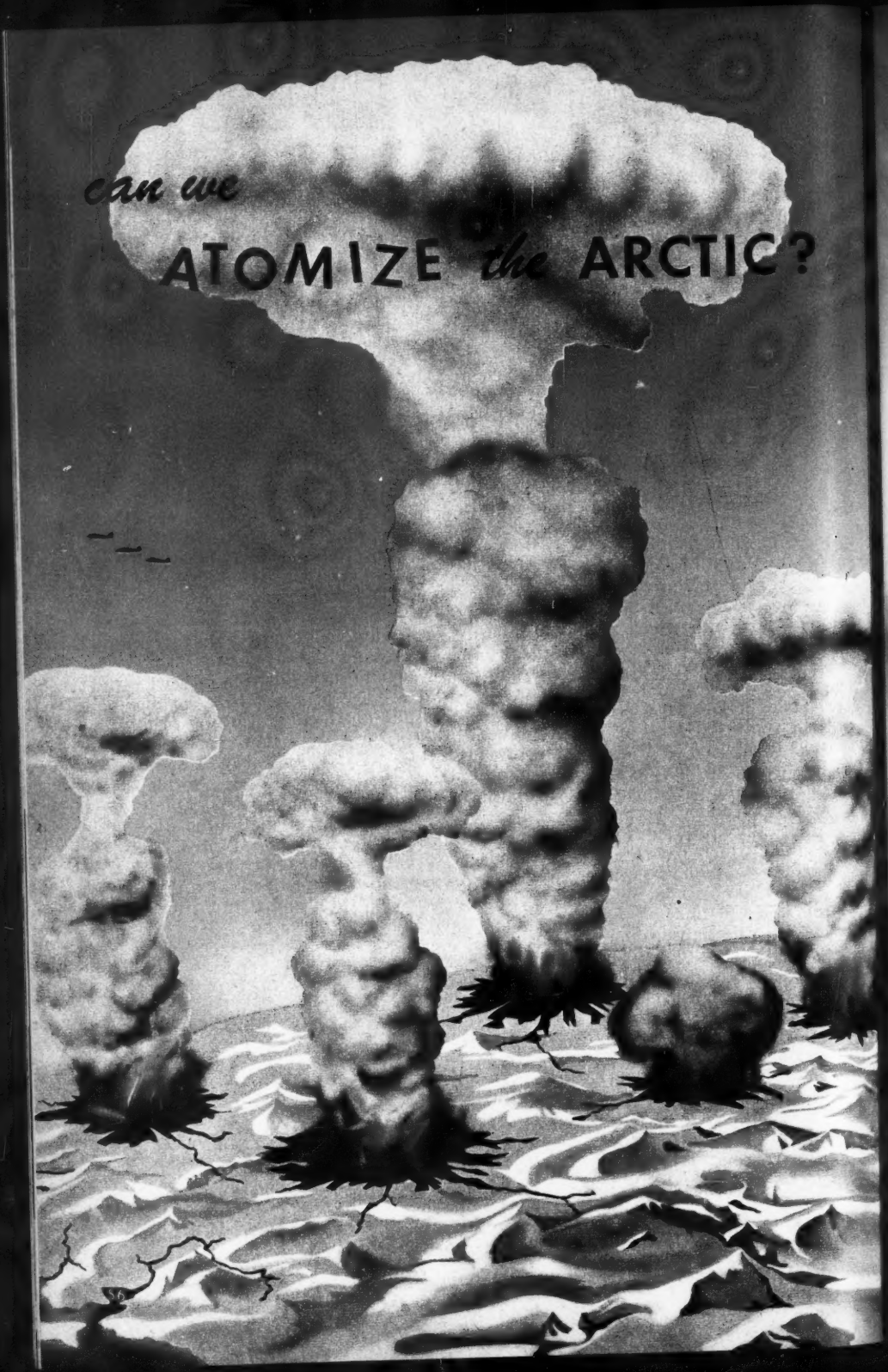
The brakes have been improved so that the pedal pressure needed to stop the car has been reduced over 25 per cent. The transmission, which in 1942 was known as the Vacuumatic, still works the same way under the new name of Hydraulically Operated Transmission. Undoubtedly there have been changes made, as there should have been, but in driving the new car any difference in action or function was undetectable.

With this transmission there are two manually-set speed ranges, and each range has a high and low which is semi-automatically controlled by the accelerator pedal. Low corresponds to standard second and first and is rarely needed, except perhaps in hilly country. To start—in operating this shift under ordinary conditions — all you do is place the shift lever into the high range (which is the conventional high position) and step on the gas. When you feel you are going fast enough to shift into higher gear, you raise your foot briefly from the accelerator and the shift is made automatically. To reduce gears from, say, fourth to third, when encountering a hill, you use what they call the "kick-down" feature, which brings automatic gear reduction simply by pushing the accelerator flat to the floor. This makes driving rather easy for the average person. There is less pedal pushing and hand shifting to synchronize.

But there are some drawbacks for the driver who at times may want to open the throttle wide without reducing gears. In fact, the same personal objection I outlined about another automatic transmission applies here. I drove my '42 Chrysler with the same type of shift from coast to coast and all through the mountains of Mexico and I would have been much happier at times if it had been equipped with [*Continued on page* 75]



**Here's the 120-hp power plant of the Royal. It's been made more accessible than formerly.**


can we
ATOMIZE the ARCTIC?

**Will the atomic bomb and UNO combine to make a world of beauty and industry out of what is now but frozen waste?**

**BY WALLACE W. ASHLEY AND ELMER V. SWAN**

"EVERYBODY talks about the weather but nobody does anything about it." So quipped Mark Twain, with perfect truth, in the years just before the dawn of the atomic era.

Now something *can* be done about the weather, however—by using atomic energy to perform a gigantic "defrosting" operation on old Mother Earth's northern refrigerator. Professor Julian Huxley has mentioned this possibility, and touched off a discussion on the feasibility of such a project and its benefits to mankind.

Most of our weather comes directly out of the North. Eliminate or modify the influences that make that weather, and the climate of our entire northern hemisphere would undergo radical changes. Rid the polar region of the vast ice-sheet and you would remove the occasional "cold snaps" that freeze water pipes and tie up metropolitan transportation as far south as St. Louis and Washington.

The vast wastelands north of the Arctic Circle would be opened up to mining and agriculture. Intercontinental airlines using intermediate refueling bases could fly the Great Circle route regularly. Warm-water ports, open the year round, could become a reality along Hudson Bay, Siberia's Arctic shores and the White Sea.

Can the Arctic ice be eliminated? Huxley believes this age-old dream of scientists and economists has come much closer to realization with the arrival of atomic energy. The terrific heat generated by nuclear fission would melt large areas of ice. A series of well-placed atomic blasts would cover an area great enough to make the results effective. Whether the "bombs" should be dropped from planes, as in the case of Hiroshima and Nagasaki, or whether towers should be constructed for remote control operation, as was done in the original test in the New Mexico desert, would be determined by a commission of scientists and economists.

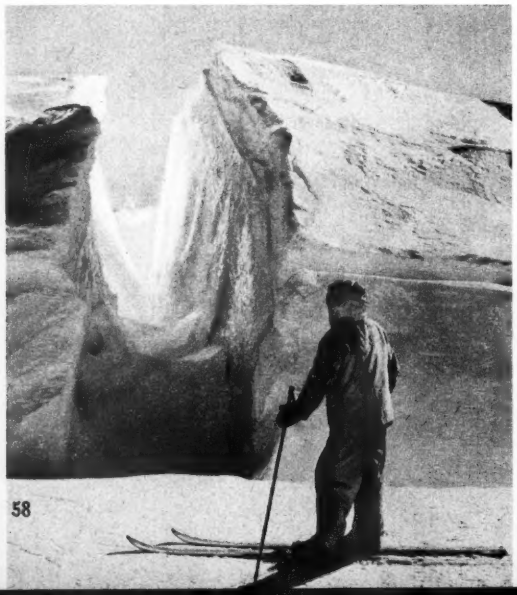
**The ice-cap of Taku, its winding glacier tongues coming down to sea level, may be changed by atomic energy into one of the garden spots of the world we know.**

The area concerned is extensive. The greatest single expanse of ice-covered land north of the Arctic Circle is Greenland, the source of the icebergs that harass North Atlantic shipping during the winter and spring months. West of Greenland are numerous islands held fast in the grip of year-round ice. Northern Alaska is icebound months at a time. Upper Siberia is bitterly cold, as American seamen on the Murmansk run can attest.

Cartographers believe destruction of the ice-sheet would enable them to get full data for the great uncharted areas now appearing only as white space on the Arctic map. It is an interesting fact that the center of the floating icepack is not at the North Pole, but at 83°50′ North Latitude and 160° West Longitude, about 430 miles below. This center is well named the Pole of Inaccessibility.

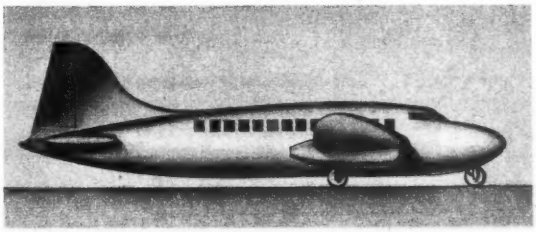
A simple computation will demonstrate that sufficient uranium is available for an Arctic de-icing project. Available also is the agency that could initiate and supervise it—the United Nations Organization. The burden of financing the work would be the obligation of all nations, since climatic benefits would be worldwide. The resultant change in the ocean's level would be felt slightly on every coastline around the globe, another reason for cooperation on an international basis. No accurate estimate can be made as to the cost involved, but many meteorologists agree the project would pay for itself many times over.

Once destroyed, the polar ice is not likely to accumulate again, since oceanographers assert that ice-sheets form only when each winter's [*Continued on page* 72]

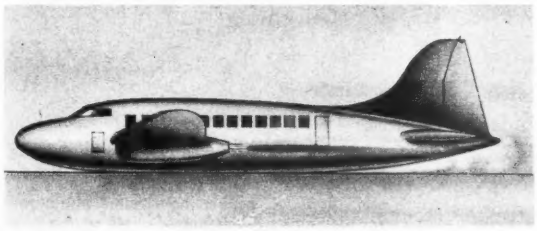


**An arctic skier looks at frozen chasm which, with application of atomic force, may become a warm and verdant spot.**

The jet plane of tomorrow leaves the ground after achieving take-off speed on the launching sled which runs on tracks.



Upper picture shows the utility wheels which the jet plane would have for taxiing. Below, a "belly-whopper" landing.



**Jet planes may land on their bellies and take off from a rocket launcher.**

It is argued by a number of aeronautical experts that jet aircraft, needing no propeller clearance, can either shed its landing gear entirely or simply keep light utility wheels for ground handling. For take-offs, the wheels would be replaced by rocket sleds such as the one illustrated at the top of the page.

In landing, the plane will skid in on its belly and sled-nosed nacelles.

Such a system of landings and take-offs would save hundreds of pounds of useless weight that might then be turned to fuel or payload. Also, take-off distances would be shortened considerably.

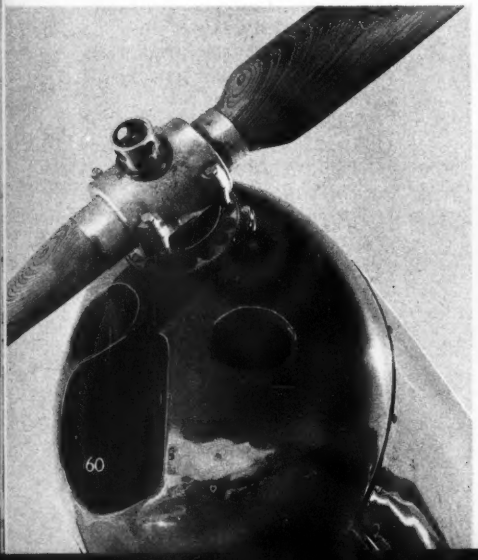
# Little Big-Time Prop

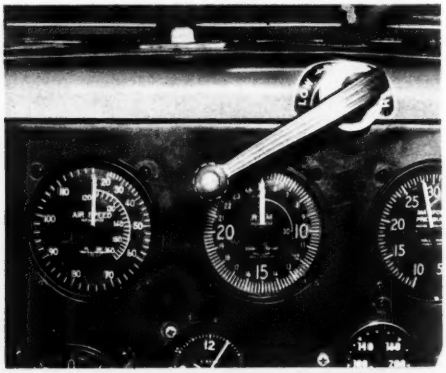
**Stick this simple adjustable-pitch prop on the front of your lightplane and climb, really climb.**

DON'T worry about small landing fields any more. Stick this new prop on your plane and you'll go up like an elevator! Well, almost. But the new Beechcraft controllable pitch propeller is really something to be enthusiastic about. It's revolutionary. Now for the very first time the small plane has a prop which puts it in the big leagues.

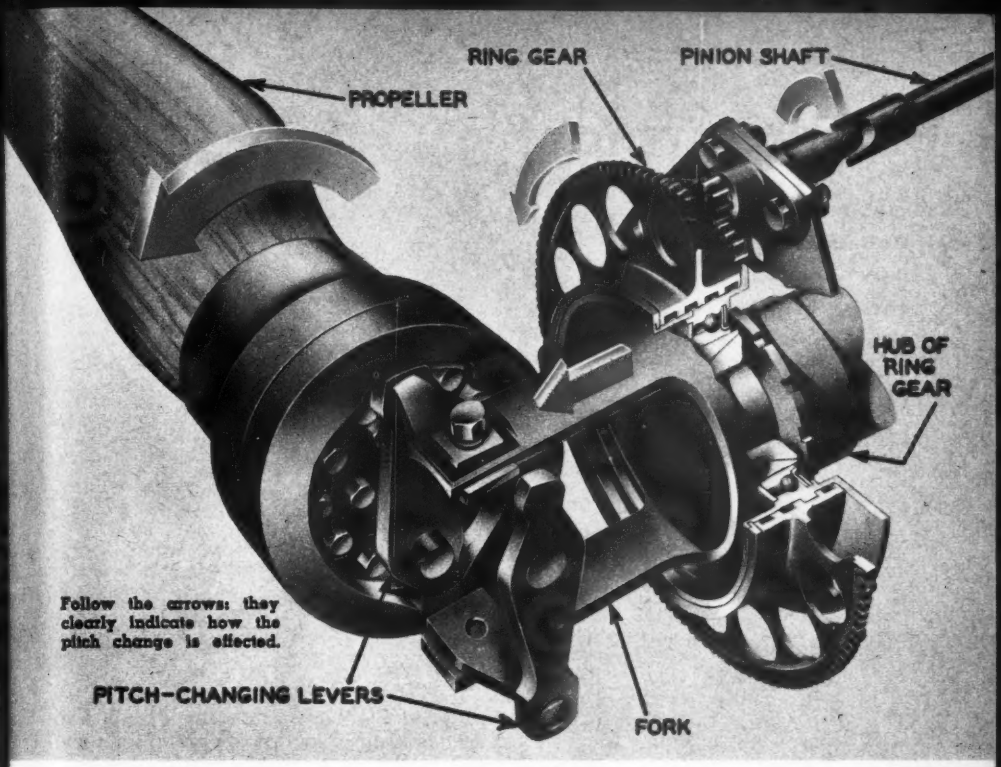
This is not the automatic pitch prop described in these pages recently.

There is a control on the instrument panel. A turn of the wrist and you take off—fast. You start to climb—and man, you really climb. When you're high enough another turn of the wrist changes





**Only the ring gear tells that this is an adjustable-pitch prop (left). A connecting pinion shaft runs back over the engine to the simple crank on the dash.**



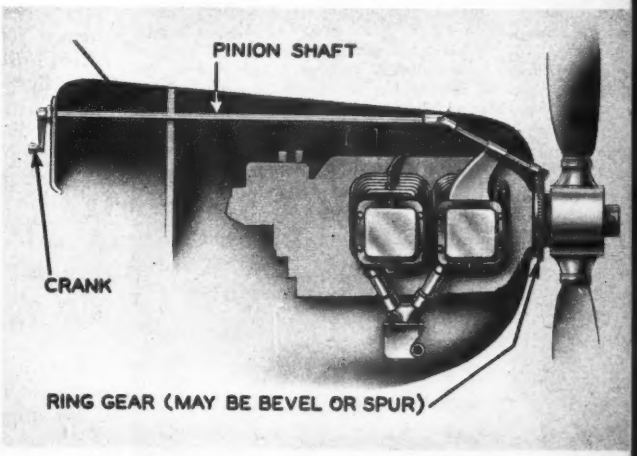

**Follow the arrows: they clearly indicate how the pitch change is effected.**

your prop pitch for fast, economical cruising. Under any flying conditions you can adjust in a second for most efficient prop bite.

But the installation must be pretty danged heavy, you'll think; after all, you want to carry that passenger or that baggage. But no, it's not at all; it costs you only 30 pounds. Sounds wonderful? But there's more. It's easy to install. Your plane doesn't have to be modified for it at the factory. And it's *simple*. There are less than a dozen parts in the hub.

Performance has been proven with two years of war use on the L-4 Piper liaison planes. Tests on a Grumman Widgeon showed that the props decreased the water take-off time to 52 per cent of that of the best fixed-pitch propellers, and decreased its land take-off time over 30 per cent. And 30 per cent reduction was shown in tests on a Culver 150-hp. radio-controlled plane.

The simplicity has been achieved through a simple principle of operation. Except for a ring [*Continued on page* 156]




**The utter simplicity is revealed by this side view. The control is easy, direct and fool-proof.**

# Plastic Armor

**Bullets bounce off the latest version of what the well-dressed warrior will wear.**

A naval officer, right, is about to fire a heavy slug at his "victim," who wears the new type of plastic armor plate.

Above, the "victim" staggers slightly from the shock of impact but is otherwise unscathed by the shooting. Below, they inspect the blunt slug.

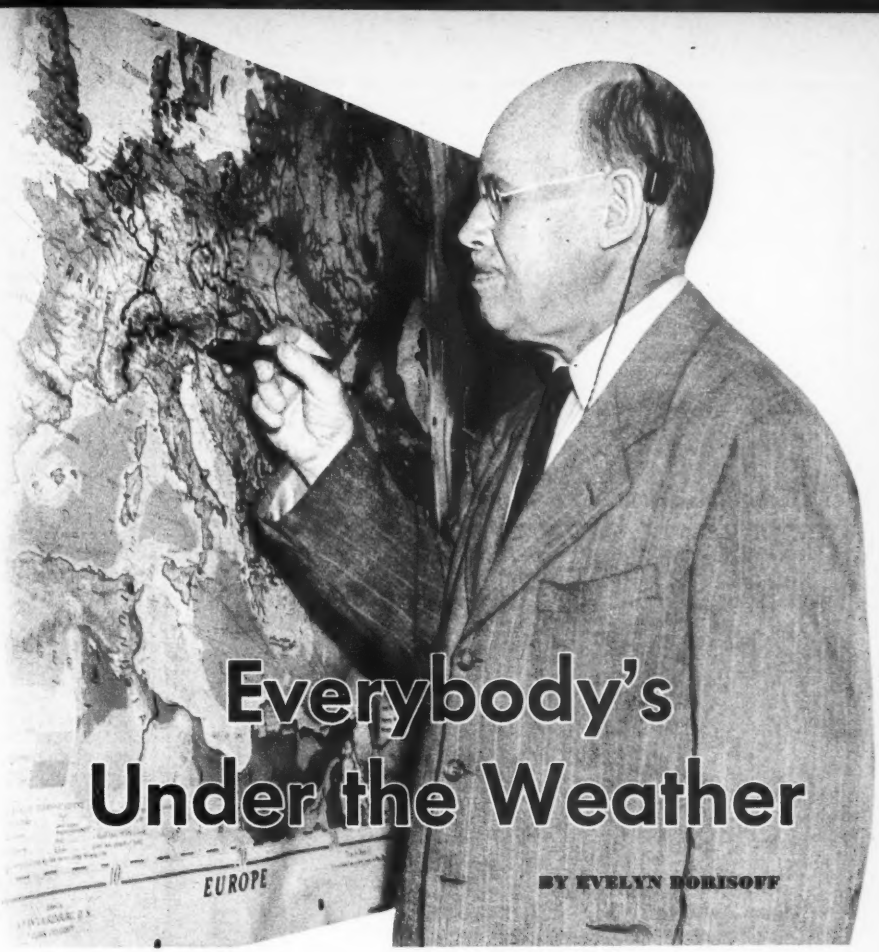
PLASTIC body armor, modern version of a suit of mail, was readied for combat use by Navy and Marine Corps assault troops just before the Pacific war's end.

Laminated glass-cloth combat jackets, battle-tested at Okinawa, were ready for the Marines who were poised to storm the shores of Japan. Laminated nylon flak suits had been given to Navy and Marine airmen to protect them against heavy ack-ack fire encountered over the Jap home islands before the final surrender.

Although not given extensive combat tests, a new glass-cloth called Doron had proved its effectiveness in use against actual bullets and fragments. The armor made of this material is lighter, more pliable and more comfortable than steel but has the disadvantage of being bulky. Its use was intended primarily for jackets for ground troops and in Navy life-jackets for shipboard personnel.

The new nylon flak suits for airmen weigh slightly more than 18 pounds, as compared to the weight of previously used Hatfield steel suits which varied from 28 to 32 pounds. Flexible nylon cloth was used by the Navy Bureau of Aeronautics for flyers and for flak curtains buttoned inside planes.

Development by the Navy laboratory of discriminat- [*Continued on page* 156]




# Everybody's Under the Weather

BY EVELYN BORISOFF

Yale's Professor Ellsworth Huntington has spent over forty years traveling around the world studying the effects of climate on human life and civilization.

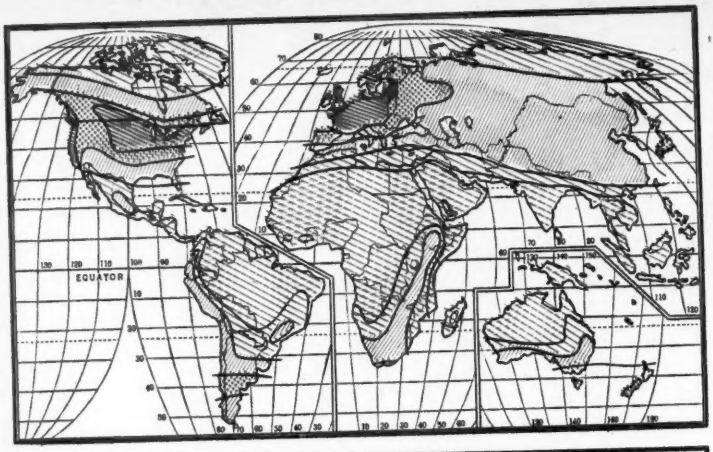
**Hate to work? Lazy? You have an excuse! Here's a fine new scientific explanation: Climate makes you what you are.**

HAS the war given you the wanderlust? Is a complete change of scenery on your postwar schedule? Would you like to have a try at ranching in Arizona or orange-growing in California? Or do you want to go even farther than that? Are you dreaming of some spot in Latin America or South Africa or New Zealand where you can enjoy a totally different way of life?

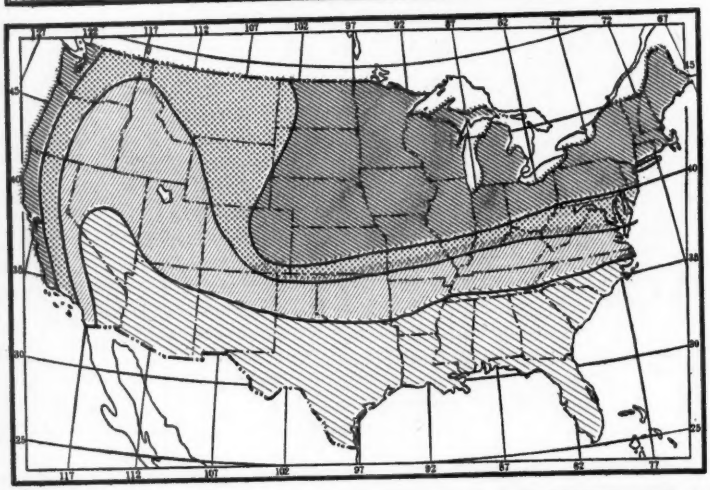
If the pioneering urge has got its hold on you and you're thinking of making a radical change, you will be interested in what Prof. Ellsworth C. Huntington, the noted Yale geographer and climatologist, has to say in his latest book *Mainsprings of Civilization* about the factors most likely to influence your chances for success in different parts of the world.

Climate, Dr. Huntington says, is one of the strongest forces shaping our lives and controlling our accomplishments. It is anything but just a handy topic of conversation.

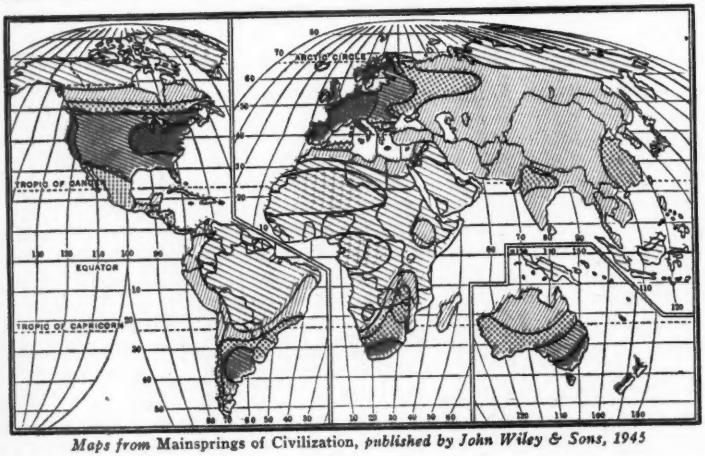
If you were to see him today in his office at Yale University, bent over a slide




**World distribution of climatic efficiency. Most heavily shaded areas show regions of the highest efficiency. Eastern U. S. is favored.**



**Climatic efficiency in the United States on the basis of productivity of workers in factories under varying weather conditions.**




**The world graded as to degree of civilization by 50 experts from 15 countries. Darkest areas are those of highest cultural standard.**

*Maps from* Mainsprings of Civilization, *published by John Wiley & Sons, 1945*

rule and surrounded by stacks of graphs and tomes of statistics, you might think him just another of those abstract scientists who are very clever at theorizing on paper, but have no practical experience with which to back up their theories.

The truth is, however, that Dr. Huntington has spent forty years studying and traveling in every section of the globe. He has lived with Arab tribesmen, East Indian princes, Australian sheep-ranchers, African bushmen, Icelanders, and Yale undergrads—to take only a small sampling. Those graphs and charts are the boiled-down essence of this rich and diversified experience.

And to him this lifetime of first-hand observation has proved that, to use his own words, "Climate paints the fundamental colors on the human canvas."

He has developed a set of maps of the world, charting the areas which from the climatic point of view are zones of highest efficiency—regions which have produced most and prospered most because of favorable weather conditions.

A look at them will show exactly the areas where climate will stack the cards most in your favor. They're accepted by experts as the best available indicators of the effect of climate on human beings, and Dr. Huntington has amassed a mountain of evidence to show just how strongly our health and abilities are influenced by climate.

He begins with simple phenomena:

**Excessive heat and humidity place a strain on our systems, form toxic, energy-stealing substances.**

**In cool, invigorating climates, we are full of pep and vigor, and operate at highest efficiency.**

It is a well-known and common enough fact that we react almost automatically and instinctively to weather and climate changes. Who hasn't felt depressed and lazy before a storm? Who doesn't pep up on days when the sky is flawlessly blue and the air dry and invigorating?

We're all familiar with these reactions. But we may not be so familiar with the fact that these physical and mental responses to climate are not products of our imagination. They are based on definite and measurable physiological tides. Pulse rates, blood pressure, respiration, the composition of the blood—all these vital physical functions are directly conditioned by the weather.

Why is this? Does it mean that we're automatons who can't rise above a little thing like a heat spell? In a sense, this is true. The body is an organism designed to respond in specific ways to specific conditions.

"We need the right kind of air in just the same way that we need the right kind of food," says Dr. Huntington.

Medical experiments have shown that the human body functions best at temperatures ranging from 60 to 70 degrees. When the mercury rises above 70 in humid climates and 80 in drier atmospheres, the heat puts a steadily increasing strain on us, making it difficult for the body to keep its internal temperature low enough. The result is too-rapid exidation which is [*Continued on page* 75]

# the ROCKET

**Plenty of speed and sedan comfort combine to make this one of the most amazing post-war light planes.**

**BY ED YULKE**

WHEN the sleek Rocket 185 dropped into Roosevelt Field last January after a speed run from Savannah, Georgia, at an average speed of 226 miles per hour, most of the boys at the field were a bit skeptical, including the author. Known to have a rated top speed of 185 mph, most of us considered the flight a freak and wondered just what the ship was really like. We found out. The simplest way to describe the ship was coined by someone on the field that day after we had seen the Rocket from all angles, inside and out. "Airline performance and sedan comfort for the average pilot and at a price he can afford."

That description sounds like a salesman's summation as he hands you a pen, but adverse comments on the field that day were decidedly lacking. One fellow with a four-figure log book was heard to mutter "tricycle gear—phooey—forget to lock the nose wheel and you're all over the airport." Then somebody pointed out the hydraulic dampeners on the steerable nosewheel. These dampeners provide directional control when taxiing yet no lock is required to prevent the ship from straying off the runway on a take-off. With no lock to worry about, the average pilot can handle a "trike" gear without any more concern than he gives the running gear of his car.

The 31 foot wingspread ship looks like

**The tricycle landing gear of the Rocket allows the plane to remain level on take-offs and landings, providing better visability for the taxiing pilot.**

**Rich Palmer, test pilot, shows the instrument panel of the new plane. Two-way radio is installed on right side of the panel.**

a beetle on the ground, the rounded fuselage, with a complete lack of external hinges, handles or fittings and gleaming with a hand-rubbed paint job looks like the hard shell of a bug. Noting the absence of slots at the wing leading edge to prevent tip stall and to give aileron control at slow speeds, we questioned Rich Palmer, the test pilot who had flown the ship from Savannah. It seems that R. S. Johnson, the designer, had found that his airfoil in combination with the wing design did not need slots. The wing is built with wash-out or twist at the tips so the angle of incidence is less than at the root. As a result, the tips stall last and smooth, positive aileron control is maintained up to the stalling speed of the airplane. In this plane, even the slight drag of slots has been eliminated, helping to make the 185 mph. top possible on 185 horsepower.

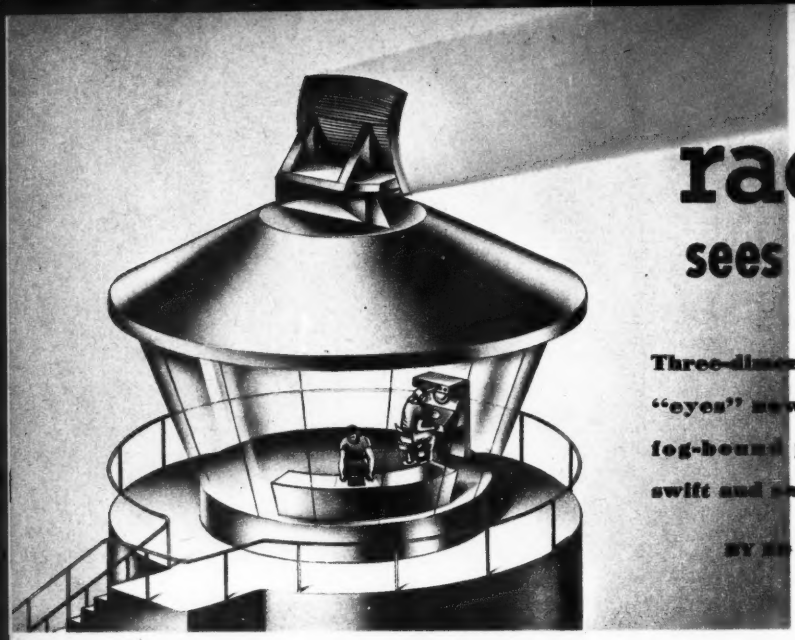
The cabin will appeal to anyone. Soft leather upholstery, neatly and attractively finished, makes one almost forget that it's a personal plane. Nowhere did we find parts of the steel tubing structure of the fuselage visible. This is in direct contrast to many of the light planes we've flown. The top of the fuselage is molded plywood, as are the wings and tail. Snapping on a switch marked "dash," we found the instruments to be all indirectly lit and, by being more than just curious, we determined that the entire panel the instruments are mounted on is shock-mounted in rubber.

Below the instrument panel, on either side of a central panel that holds the throttle and trim-tab controls, are the panels that hold the switch, landing gear and flap controls, main gas valve handle and other engine controls. The layout is neat and simple, which is the best way we know of saying that things are located where you'd expect to find them. The dials you look at are just below the top of the panel, the controls lower, where you can reach them without reaching too far.

Having rather long legs, we made particular note of the rudder pedals. They're adjustable for long legs and short and toe brakes make the taxiing a

[*Continued on page* 163]

**One of the Rocket's hydraulically operated flaps at lowest position. The plane has a landing speed of 50 mph. and cruising speed of 185 mph. or better.**

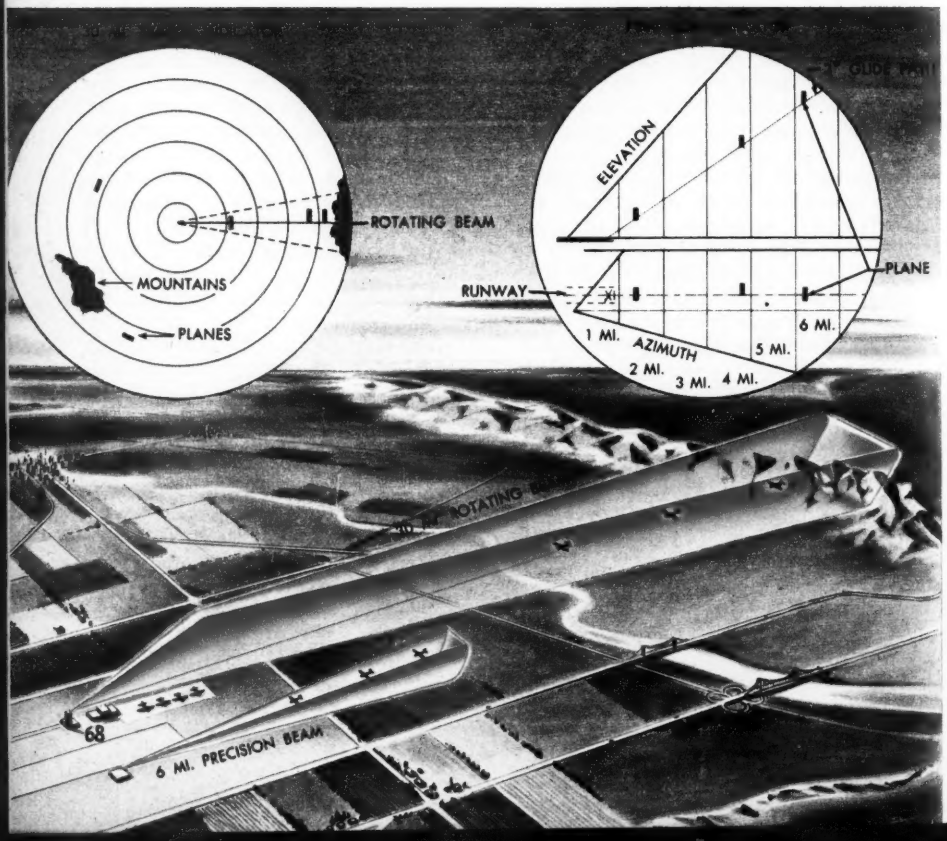


# radar sees 'em in

**Three-dimensional radar "eyes" now help guide fog-bound planes to a swift and safe landing.**

BY ED YULKE

A close view of the ground control tower with its revolving search antenna (above), and the field setup. The search indicator (left inset) shows the position of every plane in a 30-mile radius; the other affords a three-dimensional picture of the nearer planes' relation to the glide path.



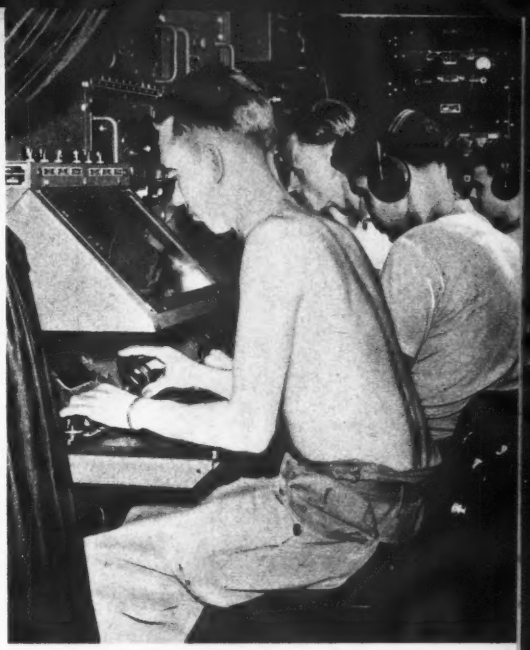
IMAGINE yourself in the control cabin of a plane, dense, smothering fog outside, only a spoonful of gas in your tanks. This could be bad trouble. You watch your instruments, but your ears are cocked toward the radiophone. Out of it comes a voice:

"You are twenty feet over the runway—straight ahead. Touch-down in two seconds."

And then in just two seconds you *are* on the ground, safe—and wanting to kiss the scanner antenna atop the control building for telling the control tower operator where you were so he could guide you down.

Radar Landing Control, most important of all air-safety devices, is an accomplished fact. It is not something yet to be perfected, but a device that landed twenty B-29's in rapid succession on the flight-strip at Iwo, when visibility along the ground was less than half a mile and the ceiling was on the runway. GCA—Ground Controlled Approach—is its military name. It quickly became a "must" at air bases in every theatre of war.

The new radar landing system is of most importance to the smaller, personal type planes which do not carry equipment other than the conventional two-way radiophone and standard instruments. But almost every plane will have radio in a short time. It may soon even become a safety requirement, since the one-time prohibitive cost has been reduced to little over a hundred dollars.



**The inside of an Army GCA unit, showing the control operators bringing planes into the landing pattern.**

How does it work? The principles are simple. First there is the "search" part of a ground radar that shows in a television-like viewplate the location of all planes and ground obstacles in a 30-mile radius around the airport. Second, there is the precision indicator or scope that literally takes a six-

**The GCA mobile unit. The trailer is air-conditioned, contains all the instruments, and mounts the antenna.**

**An official U.S.A.A.F. photo showing details of the search antenna mounted on the forward end of the trailer. Note the provision for rotation.**

mile pie-shaped segment of the search area and expands it to provide more exact indications and measurements on a 12-inch scope.

The location of the plane is first picked up on the search viewplate, and the pilot is told in what direction to fly to reach the proper approach to the airport runway. While he is following instructions, the control operator checks the plane's position on the viewplate. If the pilot makes an error, the control operator immediately advises him. Nothing the plane can do can escape the notice of the operator on the ground, since he's following the ship in the viewplate.

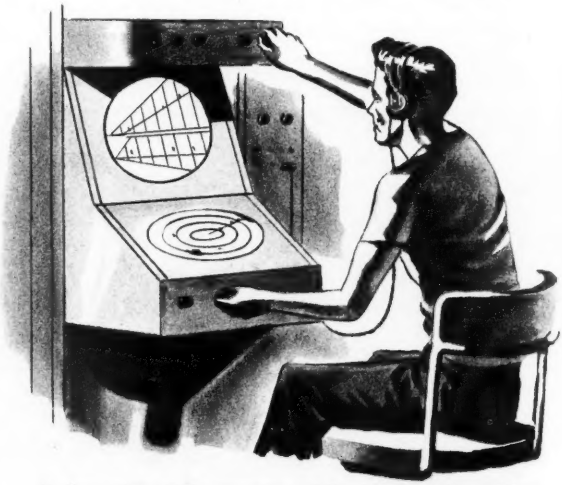
When the plane arrives in the six-mile area covered by the precision indicator the control operator advises the pilot to change course to fly toward the airport.

The precision indicator pick-up system is out in the field, 750 feet to one side of the runway that has been selected as best for blind approaches. Once in this segment, the image of the plane is picked up by the control operator on the precision screen.

The search indicator gives only one view—a two-dimensional one looking down from above over 2,800 square miles of surrounding territory; the precision indicator just covers the segment approaching the runway, but does it in two views and thus shows the position of the plane in three dimensions. Both the views are on the one scope.

The upper section of the scope is the elevation or side view indicator, the lower half gives the azimuth and range data. The elevation view shows the height of the plane relative to the earth, and a glide path marked on the indicator shows the plane's relation to the proper path to come in on. A plane position above or below the glide path is corrected by the operator's telling the pilot by radio to stretch his glide or steepen it. The azimuth locates the plane horizontally, in degrees of the compass. When the plane is to the left or the right of the center-line of the runway, its image is shown so in the viewplate, and the operator advises the pilot to change to the correct course.

Many an old- [*Continued on page* 163]



**A close view of the mounting of the search and precision indicators. The operator gives his corrections by radio.**

# SCIENCE IN PICTURES

**Spring Bonnet** for the atomic age, or what will youth do next? Olin Mumford, the happy character on the right, a native of Atlanta, Georgia, lets his buddy listen in on his home-made futuristic combination radio-sun helmet. The radio set, replete with two tubes, dials, ear 'phones and underslung batteries boasts a five foot antenna and weighs three pounds. The uniforms, incidentally, are Atlanta High School R.O.T.C.

## MI Tests The New Pontiac

[*Continued from page* 53]

then gave it the gun when the grade steepened. The car gathered speed and kept piling it on until I was over the summit nearly a half mile farther on.

I have a supplementary report on this test. Several days ago I was traveling through the Great Smokies and spotted a new Pontiac just ahead of me. It so happened that in the town of Pulaski we were both stopped by a red light, so I pulled alongside and asked the driver how he liked his new car. He said, "Swell!" "How is she on hills?" I asked, and again I got "Swell" for an answer.

He had an occasion to prove this to me just a few minutes later, for just south of Pulaski lies one of the toughest grades to be found east of the Mississippi, a mountain climb nearly two miles straight up. When I reached the spot where the grade steepens I was doing close to seventy, as the road was wide, concrete, and I could see clearly well ahead of me. In the mirror I saw the Pontiac right on my tail. As the grade increased I put my foot flat to the floor, but before I was halfway up the Pontiac came alongside, then pulled ahead.

The front grille on the '46 has been enlarged. This allows more air to strike the radiator core, increasing heat dissipation as much as 10 per cent. The wheel rims have been widened half an inch. This provides a better mounting for synthetic tires, because the additional spread of the tire beads adds resistance to crosswise deflection or rolling and at the same time gives a greater volume of air for cushioning against bruises and ruptures. Other notable Pontiac features—though not new—are the rust-proofing process which the body undergoes, which should be of special interest to everyone operating near salt water; the turning radius of only forty feet that helps make parking easy; and the inverted fuel pump which minimizes dreaded vapor lock in hot weather.

The wheelbase and overall body dimensions of the Pontiac Six and Eight are identical. The general specifications are:

| | |
|---|---|
| Wheelbase | 122 inches |
| Overall length with bumpers | 210¼ inches |
| Width | 76¾ inches |
| Height (sedan) | 65¼ inches |
| Tread, front | 58 inches |
| Tread, rear | 61½ inches |
| SAE horsepower rating | 33.8 |
| Maximum brake horsepower | 103 at 3500 rpm's |
| Torque, maximum | 190 at 2200 rpm's |
| Compression ratio (optional) | 6.5 or 7.5 |
| Compression pressure (depending on compression ratio selected) 158 or 189 lbs. per sq. in. at 1,000 rpm's | |
| Fuel tank capacity | 17 gallons |
| Road clearance, minimum | 7 11/16 inches |
| Pistons, chrome-nickel alloy | |
| Carburetor, dual type | |
| Tire size | 16x6.5 inches |

## Can We Atomize The Arctic?

[*Continued from page* 58]

accumulation of ice fails to melt. The salinity of sea water keeps ice from forming until the temperature falls to 29°; below that point pancake ice forms, but it does not increase excessively in one winter—never more than 10 feet—and it usually melts the next summer. The concern is with the ice-sheet that accumulated during past ages.

Supporting the theory that the ice-sheet would not re-form, Dr. Walter H. Bucher, professor of geology at Columbia University, likens the polar ice to a "common cold" afflicting the earth in its "head" and "feet," producing what he considers an unnatural condition. Dr. Bucher is cautious about the feasibility of an ice-blasting project, but believes that removal of all the polar ice would result in a temperate climate north of the Arctic Circle, and that removal of a major part would modify the extreme cold of winter there and restore vegetation in the cleared areas.

Geologists believe blasting the Arctic ice might pay for itself in the possible discovery of new deposits of uranium, the mineral now required for nuclear fission. Signs point to the existence of coal, natural gas, cryolite, pitchblende and marble. Cryolite is now mined in Greenland and shipped to the United States for the production of aluminum. Marble is quarried in Greenland. New oil deposits may be unearthed. Radium-bearing ore is mined on Great Bear Lake, in Canada. Gold very likely exists in the Arctic, as it does in Alaska and northern Siberia.

Alaska proved popular with servicemen and many plan to return and make their homes there. Transferring Alaska's climate to the Far North would open a large region to settlement and agricultural development. Construction of highways, railroads, airports and the building of towns and cities would provide a new frontier, a new market for the world's industrial goods, and a new source of food and raw materials.

The danger of inundating major ports or extensive areas of ocean shoreline is considered remote. The mean sea level is believed to have risen about 300 feet as the Great Glacier retreated from northwest Europe and the Ohio and Missouri River valleys to its present Arctic lair.

Working out the mechanical details of an Arctic de-icing project will require tact as well as time. More than one nation can be expected to object, fearing encroachment by the ocean on their marginal lands. Others may demand a share of the Arctic territory if it becomes productive and profitable. Some might even question the possible ill effects that atomic blasts concentrated in one area might have upon the earth and its orbit.

But the two great developments of World War II—the control over nuclear energy and the creation of the United Nations Organization—may yet be linked in the spectacular job of melting the Arctic ice.

# Here's why most Farmers prefer Champion Spark Plugs

## THEY'RE DEPENDABLE!

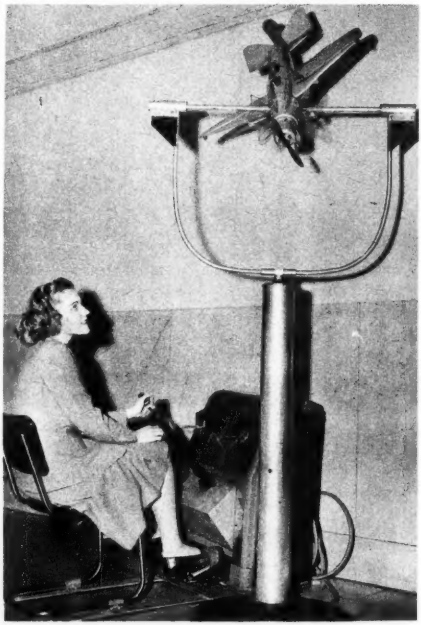
**The American farmer is by far the most proficient user of cars, trucks, tractors and stationary engines. As such he is a qualified expert on engine performance.**

**Survey after survey has proved that farmers prefer Champion Spark Plugs in overwhelming majority—powerful evidence that you can depend on Champions for better performance in every engine. Champion Spark Plug Company, Toledo 1, O.**

**FOLLOW THE EXPERTS . . . DEMAND DEPENDABLE CHAMPIONS FOR YOUR CAR**

***Kaiser-Hammond,*** a five-place contender for the family plane market, is shown as it warmed up for a recent test flight at Oakland, Cal. Twin-tailed, the all-metal pusher is a two-control plane and has been built to cruise at approximately 130 mph.

***Student Pilots*** are able to practice use of airplane controls with this miniature plane and electrically connected control board. The board is a duplicate of a standard airplane's control board.



***Plastic Lung*** is one of the latest major medical developments. Using a transparent plastic, the new lung affords greater efficiency, more comfort and much less weight than the "iron lung." One of the features of the plastic lung is that the patient may sit up or move around while wearing it. The units are ideal for life-saving and small hospitals.

## Under The Weather

[*Continued from page* 65]

caused by even a slight rise in body temperature and leads to the formation of toxic substances that cannot be thrown off quickly enough. These poisons cause fatigue.

But the maintenance of these optimum temperatures is not enough for top physical efficiency. For complex physiological reasons, the body's delicate mechanism demands a certain amount of variation. "The best condition for health apparently occurs," Dr. Huntington tells us, "when the change from the average twenty-four hour temperature of one day to the next averages about 3 degrees in summer and 7 in winter."

"In the United States human conditions and activities of many kinds show a geographical distribution which is evidently founded upon a persistent and powerful basic pattern," says Dr. Huntington. "And the only known factor capable of producing this pattern is climate acting upon the health and vigor of the people."

The "pattern" he speaks of can be seen clearly in his "maps of climatic efficiency" which we have reprinted here. The darker areas are those which come closest to having ideal climate—that is, variable moderate temperatures brought about by cyclonic storms.

Now how does climate control the things by which we judge whether or not a place is good to live in? How does it affect the health of the people?

Dr. Huntington answers these vital questions graphically with two other maps which he correlates with his basic map of climate. The first of these, a "map of health," is based on infant mortality and death and disease rates. The second is a map of the "distribution of civilization" as measured by industrial and agricultural productivity and per capita incomes. Nothing better emphasizes the role played by climate in the progress of nations than the fact that these maps, with a few minor variations, are nearly interchangeable. Where climate is good, productivity is high and so are health standards.

If you're planning on making any move after the war and want to use climate as a guide in picking your spot, you'll want to know specifically which parts of the world meet the test of high climatic efficiency. At the moment, you will have to forget Europe, although the western part of it stands very near the top of the weather list. In North America, the West Coast and a zone running eastward from the Mississippi to the Atlantic Coast in the northern United States and southern Canada, are nearly ideal.

South America offers two good areas: one in central Chile, the other in Central Argentina. In Africa, a small section near Capetown is the only zone which technically passes muster, but the whole African plateau is moderately good. Also in the southern hemisphere, the southeastern corner of Australia and the whole of New Zealand rate very high.

## MI Tests The New Chrysler

[*Continued from page* 55]

just a standard manual shift. The gear ratios in all the Chryslers have been reduced this year, which gives the cars more pick-up and snap.

El Paso is an excellent place for trying out a car, for Mt. Franklin forms the northern boundary of the city and in less than a mile you climb over a thousand feet on a paved, winding road. There I headed with the new Royal. At the base I had the car doing less than ten miles an hour and as soon as the grade steepened I opened the throttle. Immediately the car jumped ahead, but in trying to get too much out of it, I pushed my foot too near the floor and the automatic transmission reduced the gears. On a leveled-out spot I gained enough speed momentarily to lift my foot from the gas and the car shot back into high; so I kept it there until, in need of more power, I let it slide into lower gear again.

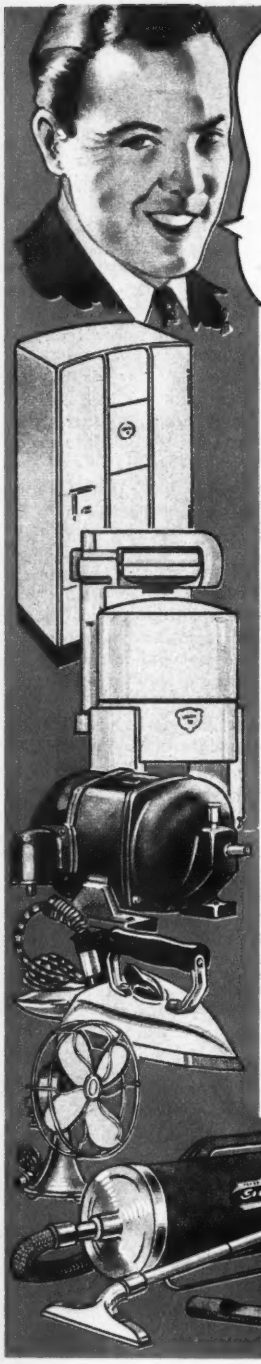
The 1946 Royal, like my 1942 Windsor, has plenty of power and got up the mountain without any fuss. And when I tried it on the level for pick-up, starting in the high-speed range, it had snap, in spite of the spongy feeling you get in all fluid-drive cars on a getaway.

To test the car's riding qualities I went over a wide series of railroad tracks, and I am forced to say that performance was not impressive. I also found the Chrysler's roadability on curves to be below par.

All in all, however, the Chrysler is a good automobile and the 120-horsepower engine, though not new, is as reliable as any built in the country.

Specifications for the Six are as follows:

| | |
|---|---|
| Wheelbase | 121½ inches |
| Overall length, including bumpers | 208¼ inches |
| Overall width | 77¾ inches |
| Tread, front | 57 inches |
| Tread, rear | 60 9/32 inches |
| Road clearance, rear axle | 8 ⅜ inches |
| Bore | 3 7/16 inches |
| Stroke | 4½ inches |
| Taxable horsepower | 28.36 |
| Developed brake horsepower | 120 at 3800 rpm's |
| Torque, maximum | 200 at 1600 rpm's |
| Compression ratio | 6.60 |
| Compression pressure | 160 lbs. per sq. in. at 1000 rpm's |
| Piston displacement | 250.6 cubic inches |
| Pistons, aluminum alloy | |
| Valve arrangement, "L" head | |
| Brake, hydraulic, internal expanding | |
| Clutch, single plate, dry, ventilated | |
| Radiator, cellular, three inches | |
| Pump, mechanical diaphragm | |
| Two-door sedan, weight, approximately 3,450 lbs. | |
| Leg and head room, ample | |
| Rear axle, semi-floating type | |
| Carburetor, single type, 1½-inch | |
| Shock absorbers, hydraulic, double acting, telescopic | |
| Fuel tank capacity | 17 gallons |
| Tire size | 6.50x15 inches |



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***A PROFITABLE LIFETIME BUSINESS OF YOUR OWN!***

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If you are at all mechanically inclined—can hold and use tools—then you have all of the qualifications required for becoming a big money earning home appliance repairman. It does not matter if you have not had a great deal of schooling or had previous experience along these lines—WE WILL TEACH YOU. Age should be no barrier—nor should any minor physical handicap.

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Profusely illustrated, our new course shows you in simple, easy to understand language and drawings how to make each repair on refrigerators, vacuum cleaners, washing machines, motors, etc. Explains and gives you a working knowledge of electricity, welding, nickel plating, etc. Shows you how to build the power tools you need and how to solicit and keep business coming to you. Not a theory course but an honest to goodness course written by and used by repairmen the country over. Price of course is so low that the savings on your own household appliance repairs will quickly pay for it. Act now! Mail the handy coupon below today.

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I really believe your course the best investment a mechanically minded man can make.—Claude E. Allen, Indianapolis, Ind.

I have received your Course in Appliance Repairing and I must say I am well pleased with same. I am only sorry I did not have said Course some years ago. I have learned so much more through this course I would not part with it.—Charles Schwarz, Hamilton, Ohio.

The Course in Appliance Servicing arrived a few days ago. Want to take out a few minutes of my valuable time to let you know that this is just what I have been looking for ever since I opened up my Fix-It shop. I must admit that you told the truth when you said that it contains quite a bit more information than I bargained for.—P. J. Bretl, Sebring, Ohio.

I am a mechanic for the Western Union Telegraph Co. Three days after receiving the lessons in refrigeration I earned the exact cost of the course.—Henry S. Lee, Washington, D. C.

I work day times at the shipyard and after 4:00 P.M. I operate from my cellar and garage. I average $10.00 to $15.00 clear every day.—Walter Hanby, Brockton, Mass.

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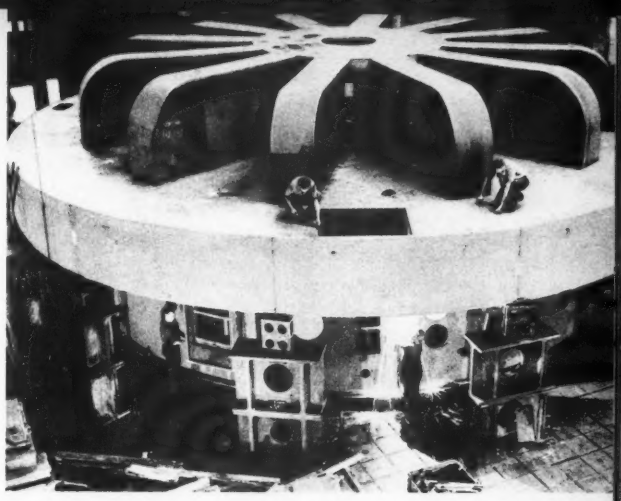
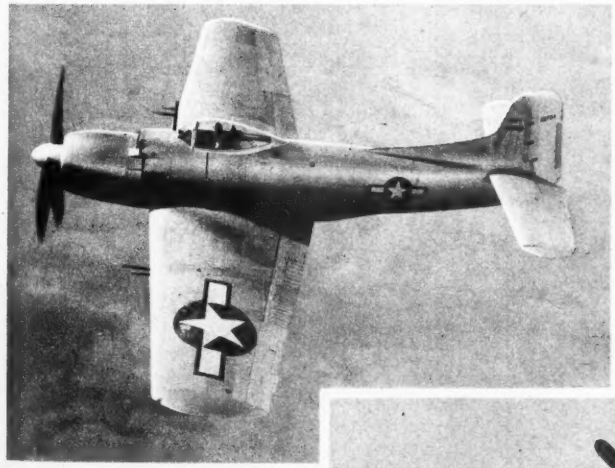
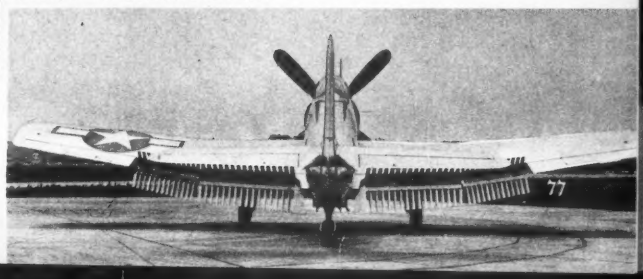
**Giant Generator** for Russia is this 90,000 kilowatt monster, one of three being manufactured by the General Electric Company at Schenectady, N.Y. The huge generator, along with its two companions, is scheduled for shipment to the USSR to replace those destroyed during the war at the Dnepropetrovsk Dam. According to GE officials, the three generators are the largest in physical size ever to be built. Note size of workmen in comparison.



**Reconversion** is okay if this picture is any indication. Three of Miami's prettiest models try their luck at fishing in Biscayne Bay in a former Army amphibious jeep, which has been repainted and generally rehabilitated for civilian use. According to the owner, it makes a great fishing boat for bays, lakes and rivers.



**The Mauler,** Navy's newest dive-torpedo-bomber, was designed for operation off new large aircraft carriers of the Midway class. Designed and built by the Glenn L. Martin Company, the plane has a maximum range of over 1700 miles and a speed of over 350 mph. Bottom view shows the plane with dive brakes open.



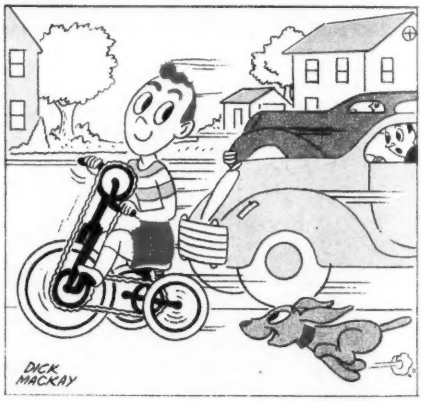
# MI LOOKS AHEAD

WITH LOUIS WOLFE

***Pedalling To Music*** soon may be one of America's favorite summer sports. A practical, small four-tube receiver, powered by batteries and equipped with a whip antenna similar to those now used on automobiles, has recently been designed for installing on bicycles and motor scooters.

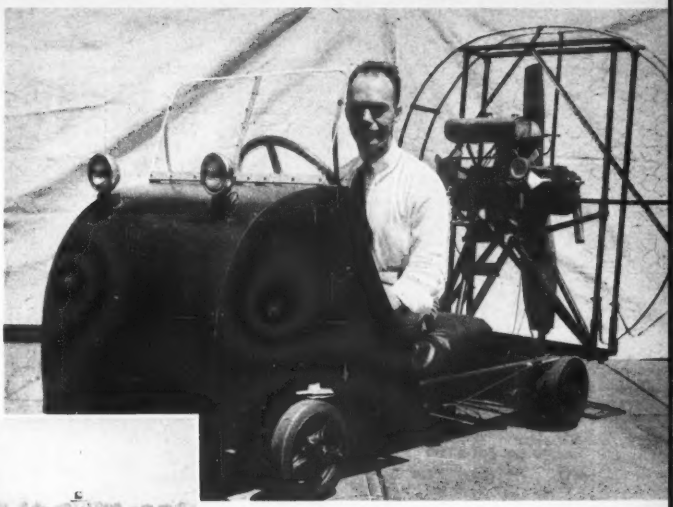
***Speedy Tricycle*** which can be driven by hand, foot or both, should be popular with children whose mania for speed has been unquenched by orthodox models. It has two crankshafts, one of which has pedals to be driven by foot power and the other is provided with grips the rider can turn by hand.

***Be A Weatherman:*** You can, with an amazing robot weather forecaster, a microphonic electron tube that is highly sensitive to pressure and heat. When it's properly adjusted the device can be used to measure changes in temperature, air pressure, altitude, depth of water and wind velocity as well as the tensile strength of metals.



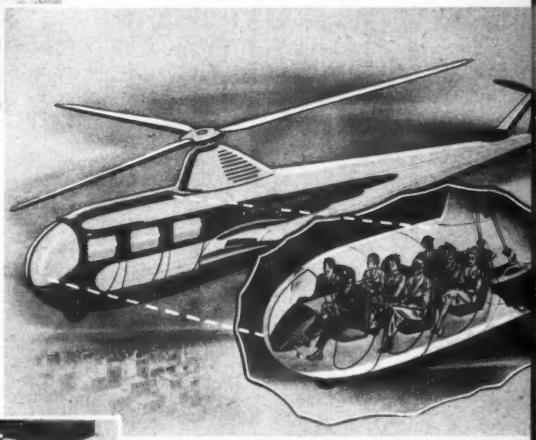

***Chewing Gum*** that won't stick to floors, sidewalks or furniture may be available soon. Based on a domestic plastic instead of imported vegetable gums, the new product will be the answer to the prayers of housewives, theater managers and civic sanitation authorities the nation over.

**"Wind-jammer"** scooter is really simple to operate because it lacks clutch, transmission, differential and driveshaft. The English-built, two-cylinder opposed, air-cooled engine, similar in size to engine used in Crosley car, actually develops 12 h.p., though rated at 7.5.

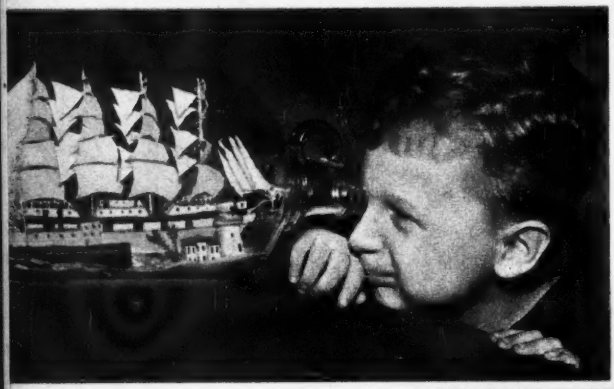


**2-Way, 2-Furrow** plow is aimed to aid soil conservation by making contour and strip plowing easier. The direct-connected tool makes plowing on hillsides and on the level easier.

**Feeder Service** by helicopter is planned by a subsidiary of the Chicago, Burlington and Quincy RR. to connect with its buses and trains. A fleet of 8-seat helicopters will be used, equipped with latest comfort and safety devices. Company has listed nine proposed routes, six in north central part of the country, three in Mississippi Valley.



**300 Tons on 64 Wheels** "heaviest single load ever moved on pneumatic tires," was moved recently on this vehicle consisting chiefly of 64 special desert type, 18-ply tires, each more than four feet tall.



The handiwork of Antonio Romano, of Brooklyn, N. Y., the ten-foot scale model of the Italian liner, Conte di Savoia, was one of the hits of show.

A youthful spectator, at left, is enthralled by one of the age-old stumpers, the ship in the bottle.

The ferris wheel is shown with its builder, 14-year-old Martin Roberts of New York City. Made of 27,000 toothpicks, the wheel was rivaled only by the Eiffel Tower, also shown.

***Hobbies*** were on full display at the 9th Annual American Hobby Show, held in New York City recently.

Largest of its kind in the world, the show was sponsored by the American Hobby Federation, and outdid its predecessors in variety of exhibits and imagination shown in their creation.

Displays ranged from the ten-foot scale model of the Italian liner, *Conte di Savoia,* shown on this page, to such varied avocations as spider web painting and painted bottle collections.

# Color Goes to Work

Red spectacles on these chickens make blood invisible, preventing the stimulation of their cannibal urge.

**Color can thwart cannibalism, repel insects, catch a thief, and increase your well-being.**

**BY FABER BIRREN**

MOST of us are likely to think of color in terms of beauty and emotional appeal, as something provided by the artist, something that concerns talent and feeling.

Yet color has practical applications which are quite apart from art. Color is put to work not alone for the pleasure it gives the eye but for the many efficient jobs it can do. Some of these jobs are unusual indeed and come as a surprise to those who have not been aware of its practical side.

During the war, for example, it was employed to great advantage in a number of widely different ways. On airplane gunsights brilliant red-orange was used to aid instant location. Colored lights on instrument

Faber Birren, color engineer, is here studying a designer's model of a fashionable window display.

boards gave visual instructions or warned of danger. Electric and oil lines were coded with hues to facilitate repair. Bomb casings and bullets were likewise marked with color to indicate type and assure the proper loading of clips. Colored smoke signals were shot from tanks to prevent confusion. Life rafts were equipped with colored fabrics—blue on one side for camouflage from enemy planes, yellow on the other for high visibility. A special fluid was available to stain the ocean and attract rescuers.

Experiments were conducted on the qualities of color that repel insects. Scientists found that dark colors, blue, red, brown, attracted most mosquitoes. The colors of least attraction were yellow, orange and white. Following this report regulation navy blue shirts were withdrawn in favor of lighter colors for malarial districts.

Color can accomplish many tangible benefits in controlling the energy that comes from the sun. Invisible heat rays can be repelled or absorbed as desired. In gasoline storage tanks, as much as 10 degrees' difference will be found in tanks painted white as compared with those of a dark color. By painting with white, evaporation may be greatly reduced. On home radiators the U. S. Bureau of Standards reports that light colors may be as much as 17 per cent more efficient than metallic paints. Thin sheets of aluminum foil reflect heat like a mirror.

In recent years fluorescent substances with color have been developed and put to a multitude of uses. Fluorescent substances convert invisible ultra-violet radiation into visible radiation. Bright pink and yellow cloths, colored with fluorescent dyes, are considerably more brilliant and eye-compelling than those colored with the conventional dyes of the past. This is because they not only reflect the pink and yellow of sunlight but also convert ultra-violet energy—adding brightness to brightness. Fluorescent colors have also been used at night on airplane carriers. When showered with ultra-violet light, the incoming plane can spot its landing place without the need of further illumination.

**ABOUT THE AUTHOR—**
**Faber Birren has been active in the field of color for 20 years, is author of 12 books and some 150 articles, and is one of the foremost authorities on color both in its psychological aspects and its functional use. He has done much with color to increase sales appeal, speed production, relieve eye-strain and fatigue, reduce accidents and build up human morale.**

**Here Mr. Birren is using a special colorimeter of his own invention.**

Thousands of colors used in industry are at hand in the engineer's files.

In crime detection, various articles such as papers and money may be sprinkled with an invisible fluorescent powder, so that the fingers of any one who handles them will be unknowingly stained. Such guilty fingers will be spectacularly exposed when the hands are held under ultra-violet light. Many forgeries and counterfeit materials may be detected by fluorescence.

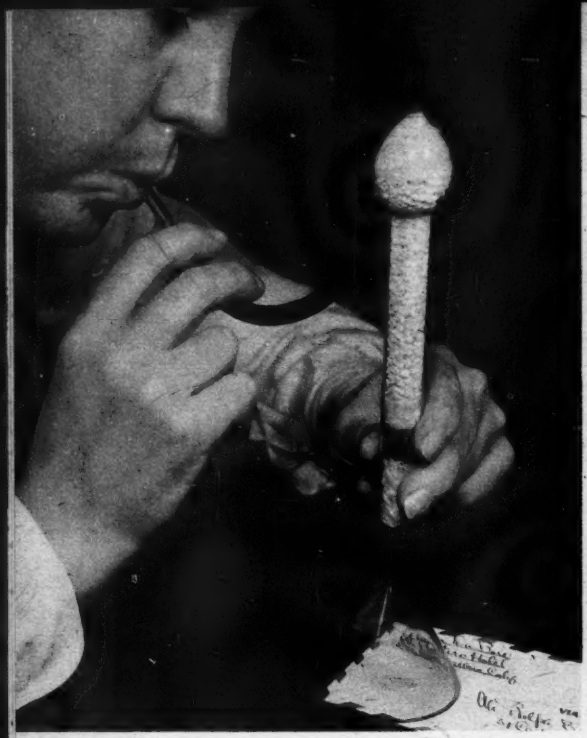
One very unusual application of fluorescent dye has lately been introduced in the field of medicine. A patient with a gangrenous leg or arm is wheeled into a darkened room and given an injection of a substance known as fluorescein. Within a few seconds the flesh, under ultra-violet light, will glow where the blood circulation is normal. The surgeon by this may know exactly where the infection begins and ends—and so perform the amputation with accuracy.

Cannibalism in chickens has been reduced by attaching bits of red celluloid over their eyes. This "washes out" the appearance of blood and thus prevents the blood lust. Careful regulation of the diet and food colors of chickens has enabled the scientist to get hens to lay red eggs, green eggs—almost any hue. Milk-white flesh, skin and fat—for which the consumer will pay a higher price—have also been attained through careful feeding. Studies now are being made toward the obtaining of eggs having a lighter yolk.

In Japanese beetle traps, yellow is used as a lure, for tests have shown it to be more effective than any other. Perhaps this is because yellow is the brightest of all hues and therefore has greatest attractive power.

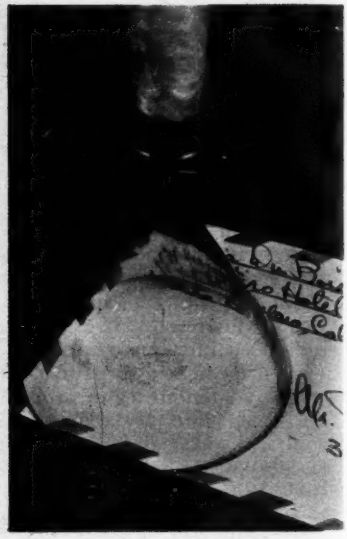
Insects do not see colors as we do. Most are partially color blind. Red to them is the same as black to us. They do not see colors at the long-wave end of the spectrum—red-orange—but they respond to yellow and blue and can also, well beyond the ability of man, see ultra-violet radiation. Thus, as far as light sources are concerned, blue light and even invisible ultra-violet light will have strongest attraction for them, and lamps of red or orange hue will make the best repellent light for porches and tents. Both effects may be used at one time—a red or orange light nearby and a strong blue light at a removed point to set up a more intriguing beacon.

Colored light has a curious action on human beings. The sodium vapor lamp, which transmits only yellow light, will distort the appearance of almost all colors. In one experiment, food on a well-laid banquet table was rendered extremely unappetizing under the light of a sodium vapor lamp. The potatoes became gray, the meat greenish, the vegetables ashen or nondescript hues. So great was the color distortion that nausea was produced in those present. Foods delight the eye as well as the taste. If the colors are ugly, the food may be unsavory even though prepared by the best of chefs.



**Blown chemical fumes cause orange fingerprints to appear where none were visible before (left). Below, close-up of prints.**

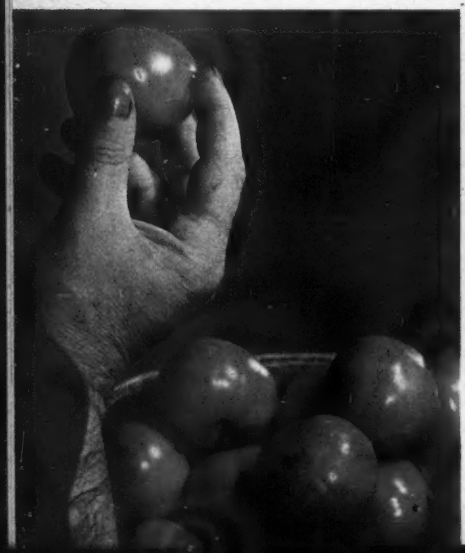
*Photos by Leeser, Camera Clix*

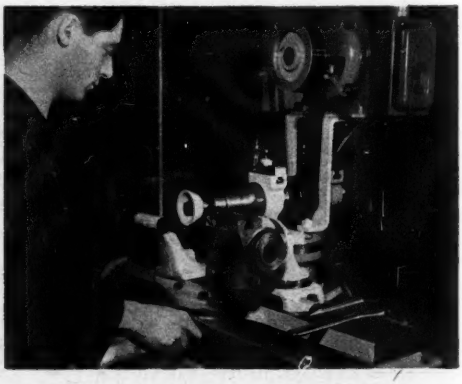


Color has been applied very practically and efficiently in factories during recent years. Du Pont has developed a safety color code in which hues are used to convey specific messages, clearly and without contradiction. Yellow and black stripes are employed to mark strike-against hazards, low beams, dead ends, the edges of platforms and juts.

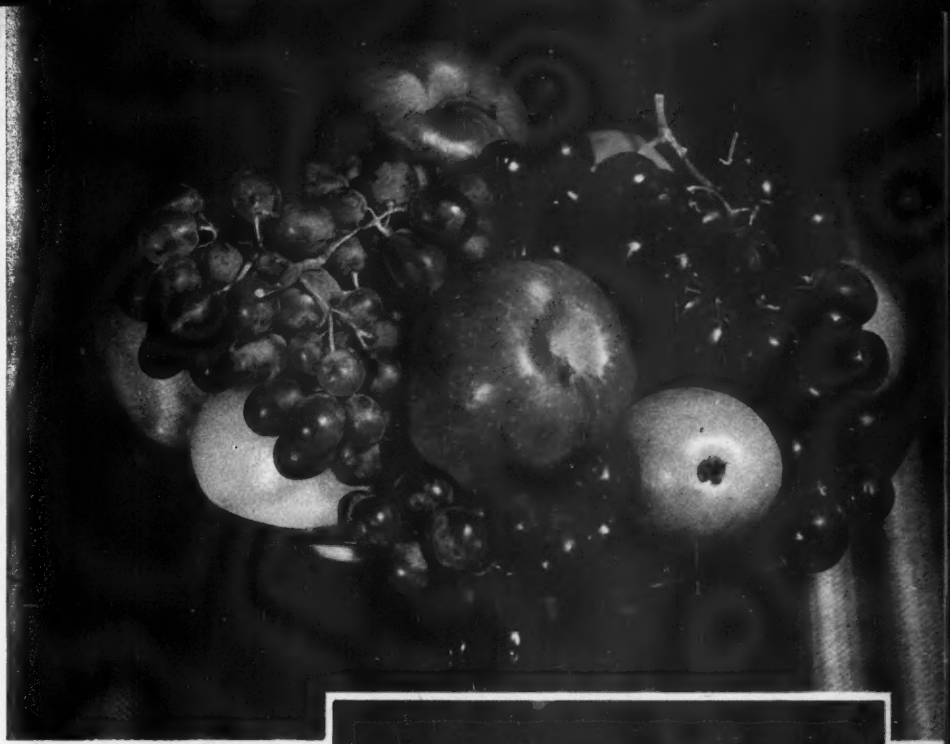
Orange, the color of maximum attention-getting value, is placed on areas likely to cut, crush, burn or shock the worker. It is painted along cutting edges, on gears and rollers. Used on the *inside* areas of switchbox doors, it fairly screams out its warning to keep such doors closed.

Red is reserved to identify fire protection equipment, green to locate first aid devices, stretchers and medicine cabinets. Blue symbols are hung on machines or





**Tomato color must match the picker's finger nail polish (left). Above, color well used on a machine.**



**Fruit seen in normal light looks appetizing (above), but loses all appeal in a tinted light such as sodium vapor.**

devices specified for repair. Here the practice follows one in railroading, where blue signs or lanterns are placed near cars which are not to be moved without consulting the repairman in charge.

On machines, color serves the double purpose of appealing to the eye and making its seeing task easier. Dark, drab machines whose parts and materials may look confused are made to stand out conspicuously, with good contrast. Working areas may be highlighted in a pale buff, with the body of the machine in medium gray. This aids visual concentration, cuts down accidents, and encourages good housekeeping.

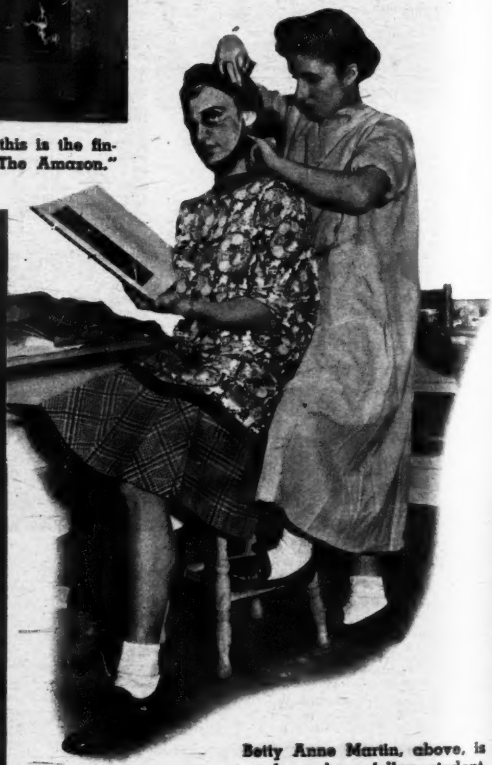
The Du Pont safety code for factory and machine, and their program, "Three-Dimensional Seeing," are coming into ever wider use. And this is good, for we spend most of our lives working with machines or among them, and having accidents and undergoing eyestrain and discomfort which proper application of color would help prevent.

We are all happier when in a pleasingly colored environment, but science as well as art must have a hand in its specifications. Eye comfort must always be added to emotional interest to increase human efficiency and happiness and health.

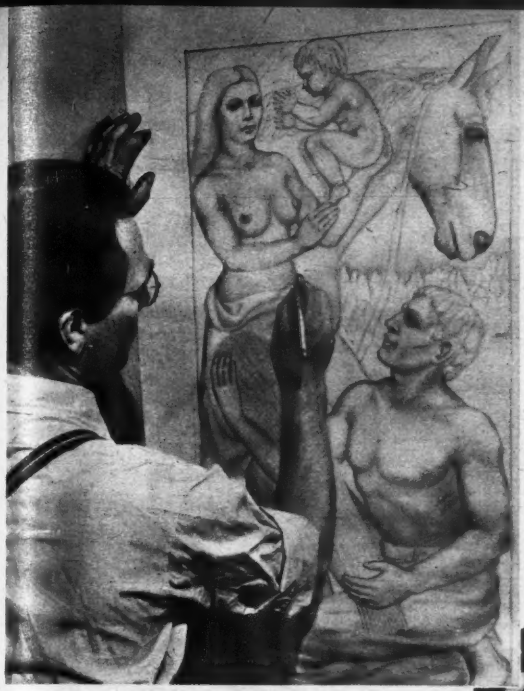
# *Art that Lives*

ONCE a year the students, faculty and friends of Wellesley College are treated to an exhibition of art in the flesh. Famous paintings are reproduced in tableau form with members of the college Art Society participating as models, costumers, directors and make-up artists. The figures are posed with a large picture frame and a fine black screen to heighten the illusion of an oil painting. The finished reproduction represents a combination of finest artistic skills.

**Almost indistinguishable from the original, this is the finished "production" of Courbet's painting "The Amazon."**



**Betty Anne Martin, above, is made up by a fellow student. Left, production is "staged."**



# CARVED GLASS

BY HARRY BATES

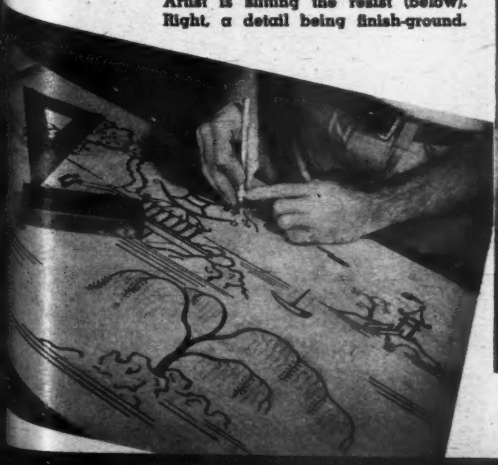
**Sand-blast "guns," pointed by artists, carve glass into objects of much beauty.**

Finishing the first step, the making of the drawing. Below, pouncing the outlines into the resist.

THE sand-blast "gun" may not seem a likely artist's tool, but David Harriton of New York City has been carving glass beautifully with it for 20 years, and today his product ranks as a new art medium and he and his group as modern pioneers.

His glass carvers don't of course just get an idea, pick up a "gun" and aim it. First a paper drawing is made and the outlines perforated. This outline is then transferred to a resist—a sheet of absorbent paper saturated with glue and glycerine—by laying the two together and pouncing black powder through the perforations. Then pieces of the resist are cut out in the places where the

Artist is slitting the resist (below). Right, a detail being finish-ground.



A young Hercules on horseback (above). Below, a swimmer astride a sea-horse.

Here is the sand-blast room (above). Through the panel the artist guides his "carving" nozzle along the glass.

**A stylized fish (above). Below, a carving done on the front of a thick mirror.**

glass is to be carved. When the resist-covered glass surface is exposed to the sand-blast the soft resist gives and is not cut, but the hard glass which shows through the holes is blasted away—as rapidly or as delicately as you please by use of proper grits, streams and pressures.

Twenty kinds of nozzles are used, with holes ranging from a sixteenth to half an inch in diameter. The life of a nozzle is only thirty minutes. And the sand—aluminum oxide, extremely hard—can be used only about 10 times, so quickly does it wear out.

Glass carving is not a child's hobby.

*Photos by Pickow, Three Lions*

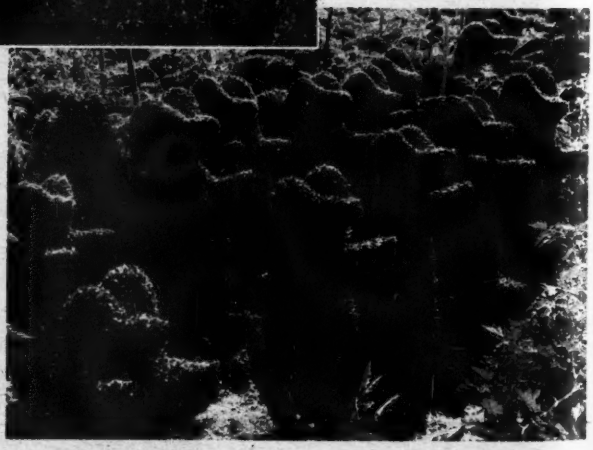
# Wonderland Garden

**Time and patience produce a fantastic world of trees.**

Years of training turned this tree into a giant corkscrew.

A handsome peacock is not too much to expect from the topiarist with lots of time.

Evergreens with the proper training can give a perfect imitation of teddy bears.

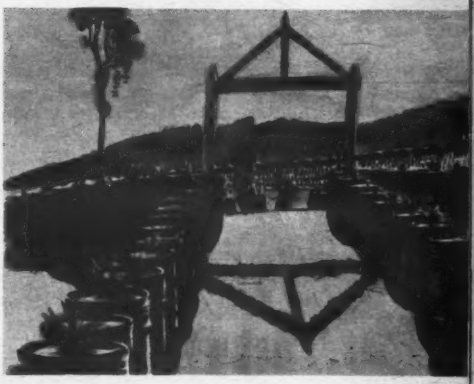


TOPIARY is one of the oldest and most pedigreed of all the garden arts. It consists, briefly, in making trees and bushes grow up to look like almost anything but their natural selves and has been a popular sport of gardeners since the days of the Greek and Roman empires. Here we see some of the fantastic growths produced at Klinkert's Topiary Nurseries at Kew, near London.

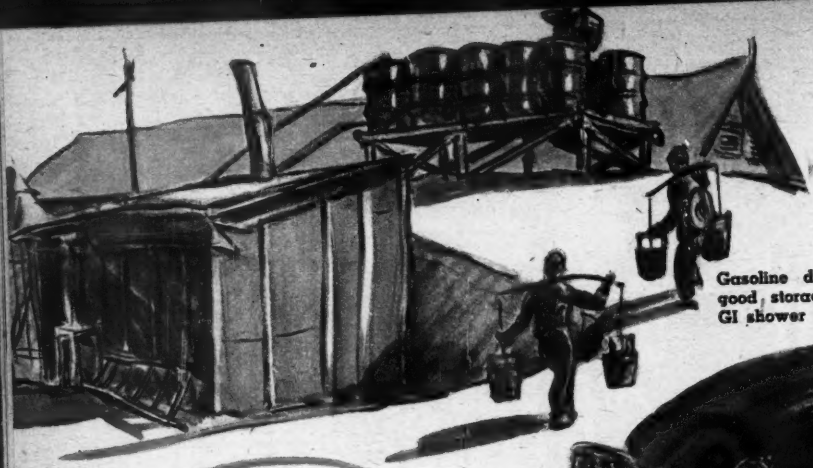
Empty gasoline drums make an improvised grease pit for a GI motor pool in China.

BY SGT. NORMAN C. SAUNDERS

WHEN the age-old ingenuity and patience of the Chinese is blended with the oft-demonstrated resourcefulness of the American GI some tricky developments are bound to result. Nowhere in the world wide theatre of war has the empty gasoline drum come into its own as it has in China. Originally the drums contained gasoline which was flown across the "Hump" to the air and ground forces in China's interior. Cargo space on transport planes was far too valuable to be used in ferrying the emptied containers back to refueling points. On this and the following pages we see how base metal is transmuted to gold when East meets West over an abandoned gasoline drum.

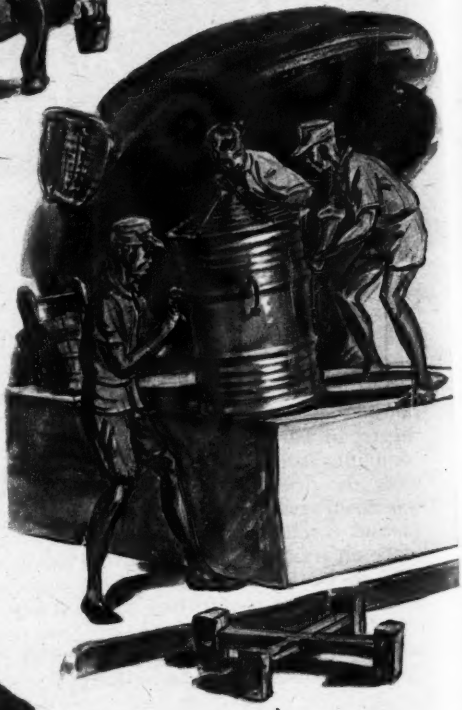


A Chinese cemetery uses drums for ornamentation and a beggar, below, has found a home.

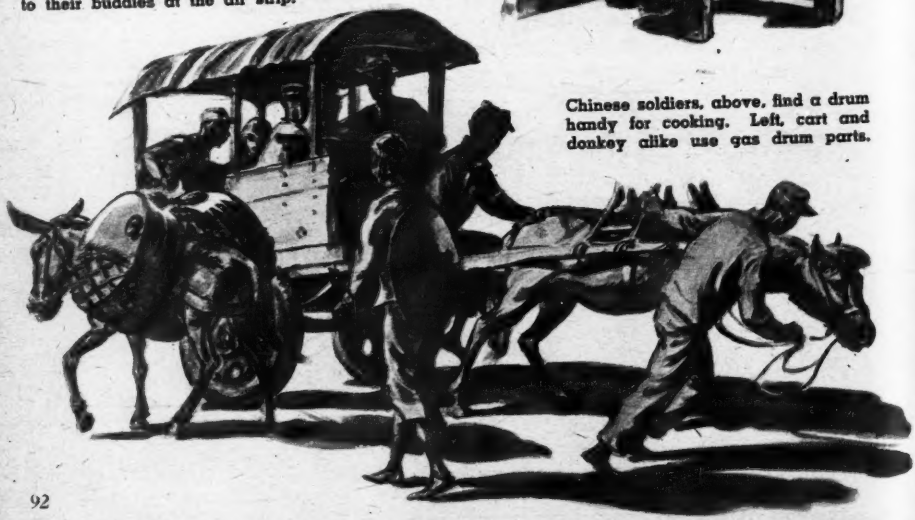


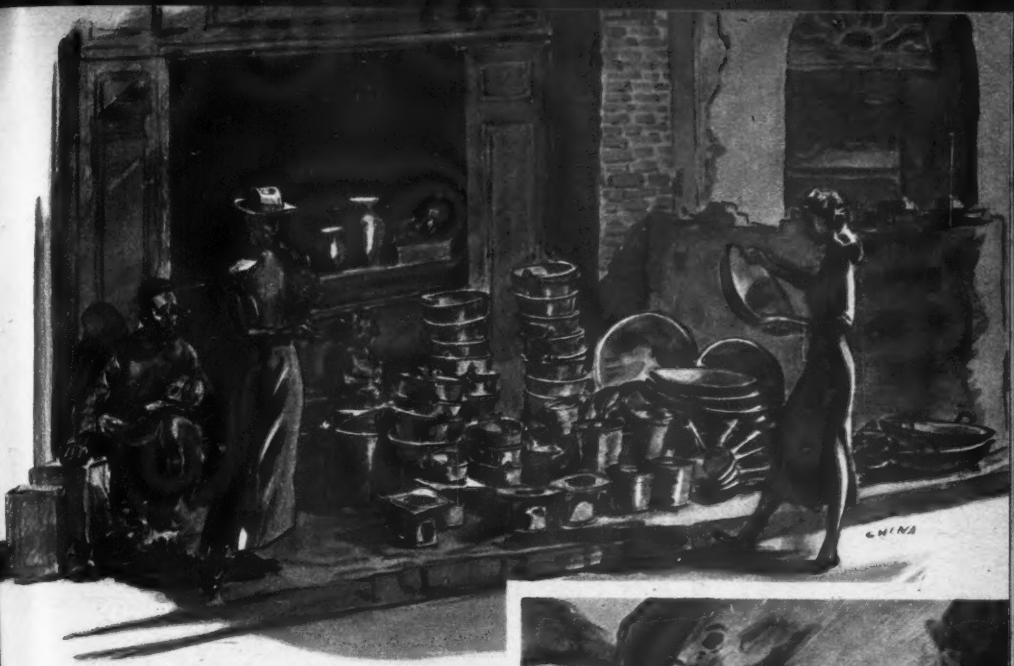
Gasoline drums make a good storage tank for a GI shower at an air field.

Two coolies tote a supper of rice to their buddies at the air strip.



Chinese soldiers, above, find a drum handy for cooking. Left, cart and donkey alike use gas drum parts.






Old gasoline drums plus Chinese ingenuity supply a hardware merchant.

A bombed-out bridge on the Burma road is temporarily repaired with gas drums.

A drum is a heating unit of a charcoal alcohol converter still on a Chinese truck.

# WHY TROUT LEAVE HOME

Mr. Thomas checks over his choice Tonkin cane. Five years of aging are necessary before use.

THE little trout wiggled with excitement. "Mom! Gran-pop grabbed the bug and then went nuts! He circled and reversed and ran like anything—and then he slid up out of the world and didn't come back!"

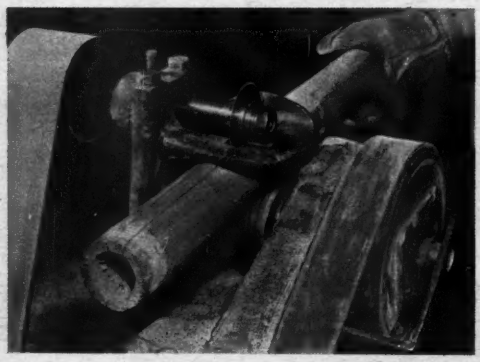
Good fishing rods slide many a gran-pop "up out of the world."

Tonkin, a Chinese cane, is the best material. It is aged and split into strips which are beveled and hand-worked into a perfect hexagonal fit. Knots are filed down and staggered.

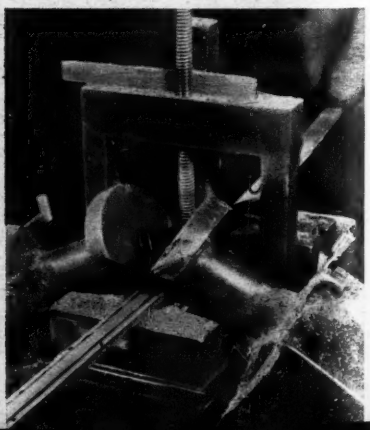
In the photos we visit the shop of Leon Thomas in Bangor, Maine, where the making of fly rod masterpieces is a family tradition.

A fine fly rod is surprisingly light and flexible and strong. A 22-pound Atlantic salmon has been landed on a Thomas rod weighing 2¾ ounces—128 times its weight.

First the fiber is tested, then a miniature circular saw cuts the cane into short strips.



The strips are fed through a beveling machine which gives them a triangular cross-section.



Fine craftsmanship demands expert handwork. The strips are given a perfect taper by hand filing.

Six of the tapered strips are assembled, glued, then wrapped with cord in this binding machine.

Measurements, weight and taper must be accurate. Here Mr. Thomas is checking a taper with calipers.

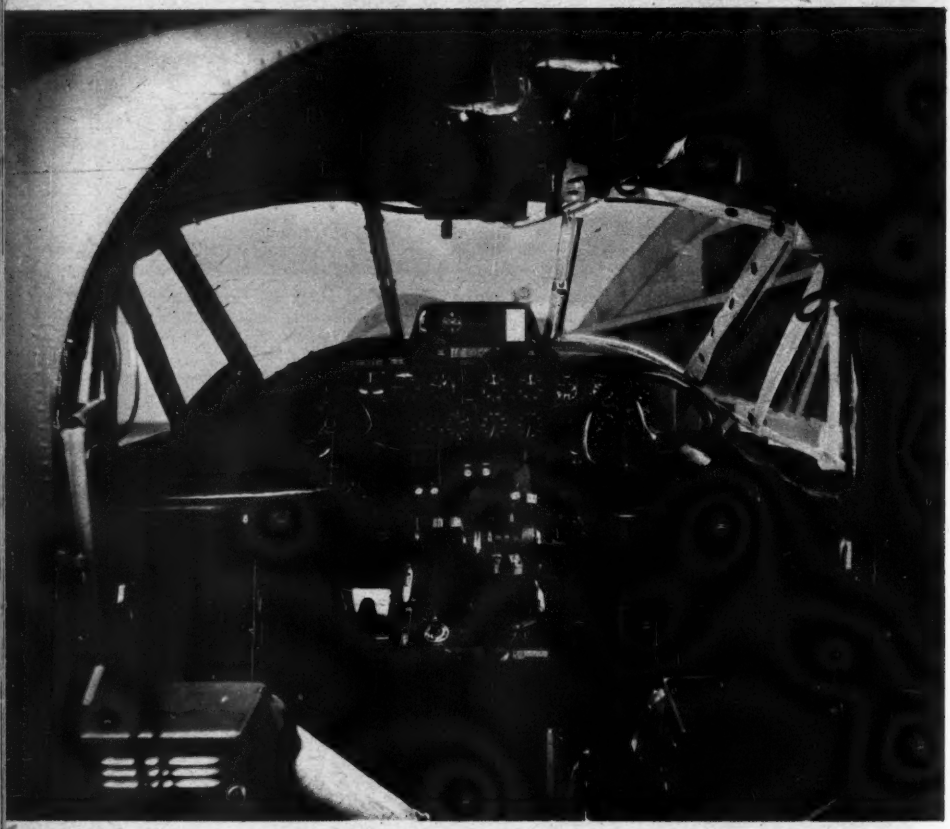
A craftsman is putting on the reel seat. Note that the grip is built up of 12 cork washers.

After the rod has been varnished the guides are wound on. The finished rod contains 128 pieces.

All kinds of rods, some whippy for wet fly fishing, others stiffer in action for dry fly fishing.

# "Blind" Trainer

BY DON ROMERO



The cockpit of a dual control ship with orange glass windshield. Below: As the goggled trainee sees it.

**Colored glass may save the army millions in its training of pilots.**

A PAIR of blue-lensed goggles and an orange-colored windshield are now providing aviation experts with something they've been desperately seeking for years—a simple, effective method by which pilots can be quickly trained in the complicated business of blind flying.

Up to now inventors have racked their brains devising any number of intricate training aids to do the job. Costing thousands of dollars and hundreds of man-hours, these aids usually consist of some type of cockpit mock-up in which a trainee sits at the controls, an overhead hood is pulled down to [*Continued on page* 166]

# Tilt-Top Hamper

**Tilting top permits deposits from front or rear. The hamper is much more attractive to look at than the customary open wastebasket.**

**Utility, grace, and cheerfulness combine in this wastebasket to snap up the decor of a "tired" room.**

A ROOM can be pretty but as tiresome as a pretty girl talking in a monotone. What is usually needed is some color-relief—some emphasis—some zest—a new note. Such relief can be introduced by the use of occasional pieces in contrasting colors and suitable decorative motifs. The tilt-top scrap-hamper illustrated here and described is just such an accessory. The construction is simple and the design and decoration can be changed to suit individual tastes.

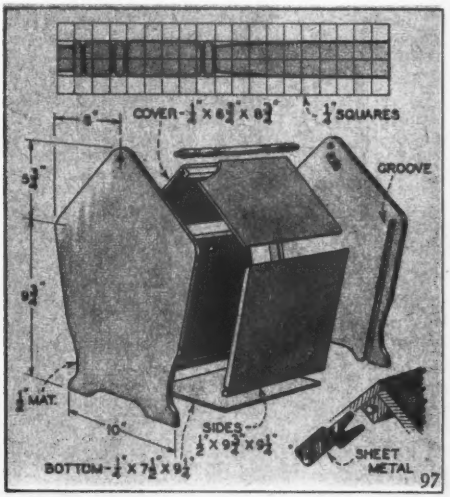
The ends of the hamper, and the sides are made of ½ in. pine. The ends are grooved, as shown, to take the side pieces which are also grooved at their lower ends to engage the bottom.

The tilt-top and the bottom, are made of ¼ in. plywood. All joints are glued, and nailed. The brads are set and the holes filled with putty or plastic wood so that the surface is perfectly smooth to the touch.

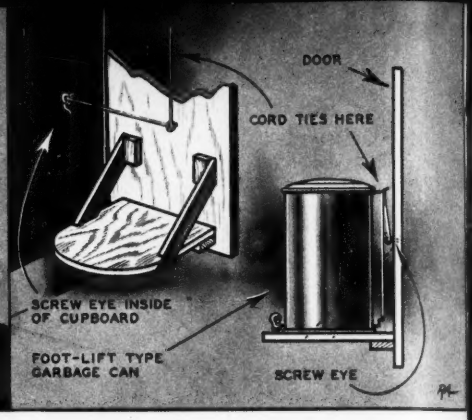
The pivot for the tilt-top is made as shown in the detail. The brackets are cut from 24 gauge metal and screwed to the inside with flathead screws countersunk into the brackets. Two 6 penny nails, one in each end of the top on the centerline drawn from the peak, ride in the brackets. The handle may be turned from a ½ in. dowel or may be made of rope, knotted at each end.

After the hamper is assembled it should be carefully sanded. This is important as any [*Continued on page* 146]

**Tilting top can be easily removed to empty the hamper. This one serves a boy's room.**



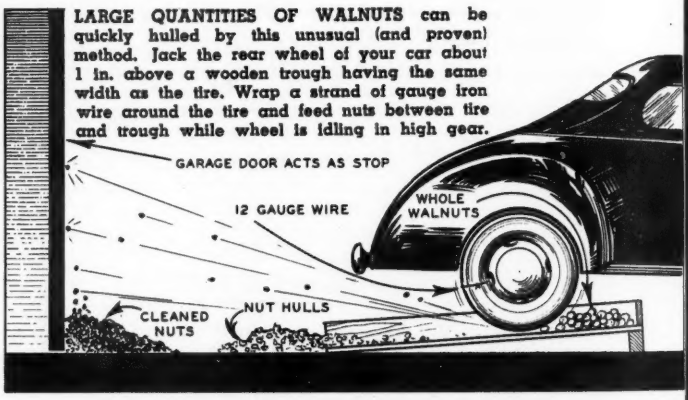
# TIMELY TIPS



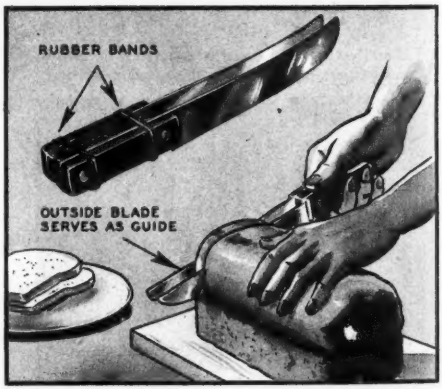

**YOUR KITCHEN GARBAGE RECEPTACLE** can be cleverly concealed beneath the sink and adjusted to open automatically whenever the cabinet door is opened by attaching a string to the can top lever.

**RUSTING OR CORROSION** of drawing and other fine instruments can be avoided by moistening the lining of the case with a few drops of Spirits of Camphor. Always keep the case closed when the instruments are not being used.

**LARGE QUANTITIES OF WALNUTS** can be quickly hulled by this unusual (and proven) method. Jack the rear wheel of your car about 1 in. above a wooden trough having the same width as the tire. Wrap a strand of gauge iron wire around the tire and feed nuts between tire and trough while wheel is idling in high gear.

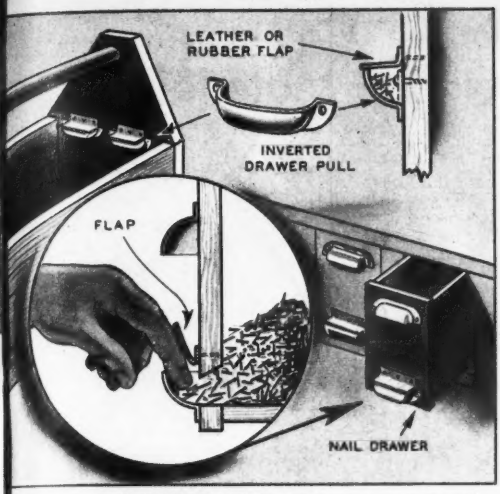


**A HAND POWER TOOL** of the type illustrated is much more conveniently handled when counterbalanced by a weight, thereby permitting all effort to be centered on the drilling or grinding operation. Attach the suspension wire to the tool by wrapping the case with friction tape, as shown.



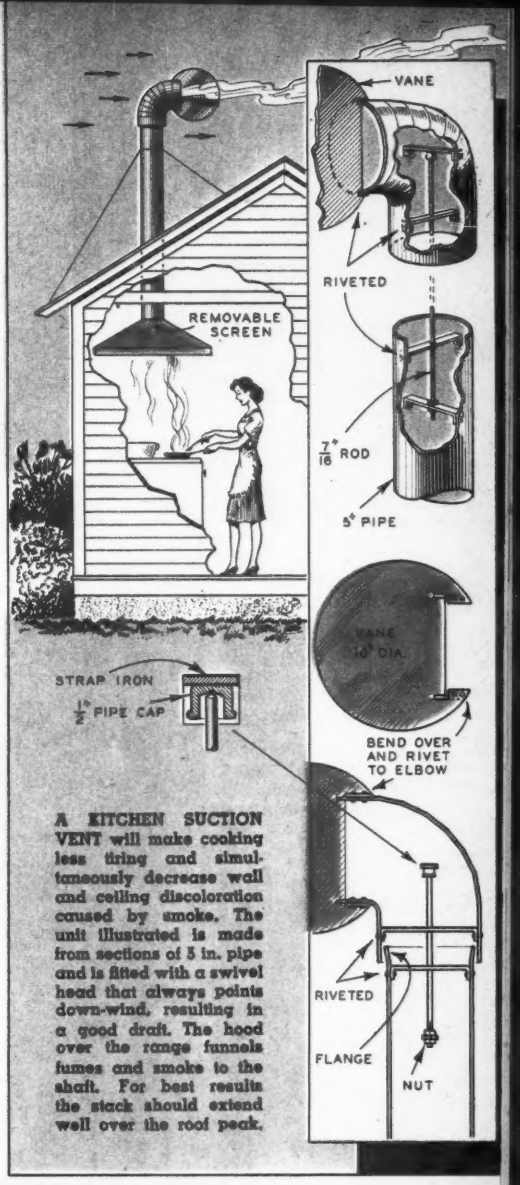

**CUTTING BREAD** or other food into slices of uniform thickness is easily accomplished by fastening the handles of two knives together with rubber bands or string. The inner blade does the cutting; the outer blade serves as a guide.

*Mechanix Illustrated*

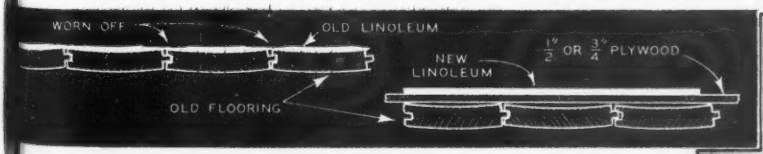



**A DRAWER PULL** of the cup type is ideal for dispensing two or three small nails at a time or else serving as a toolbox container for brads, screws, etc. A rubber or leather flap nailed above the cup opening keeps chips and dirt out.

**A WATER LINE** on your coffee-maker, painted on with colored nail polish, will insure your using the same amount of water every time coffee is made. Being waterproof, the line will not rub off when the jar is washed. Roughen surface before painting.



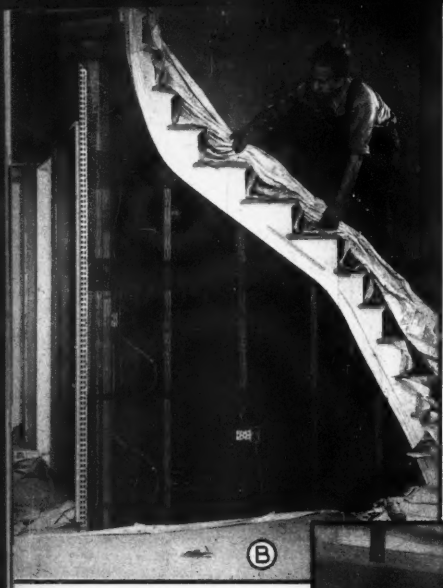

**A KITCHEN SUCTION VENT** will make cooking less tiring and simultaneously decrease wall and ceiling discoloration caused by smoke. The unit illustrated is made from sections of 5 in. pipe and is fitted with a swivel head that always points down-wind, resulting in a good draft. The hood over the range funnels fumes and smoke to the shaft. For best results the stack should extend well over the roof peak.



**WHEN LAYING NEW LINOLEUM** over floors having separated or warped boards, first lay ½ or ¾ in. plywood over the entire surface to insure a smooth, ridge-free job. Linoleum or oil cloth layed directly over warped or separated floor boards will crack within a short time.

# Protect Your Building Materials

BY J. MODROCH



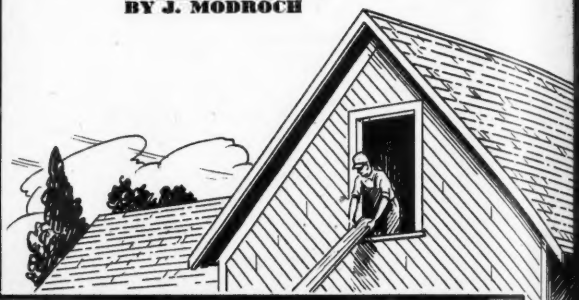
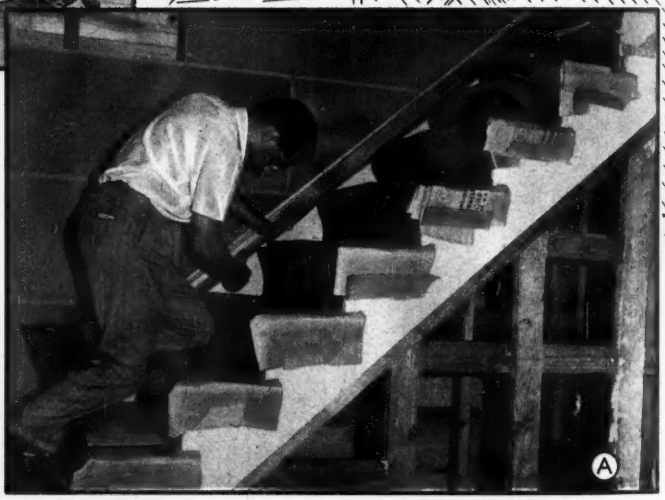



FIG. 1

**Above: Spreading a tarpaulin over newly laid steps. Keep the steps covered until ready to install the stairposts, railings, etc.**

**Right: Tacking building or wrapping paper over steps.**



PROTECTION given to building materials during construction pays dividends in reduced costs and improved quality of the completed project. The following recommendations cover a few of the familiar practices generally employed on the job by experienced builders for the protection of commonly used materials. By using them as a guide, methods of protecting the numerous materials not mentioned can readily be devised from information supplied by the manufacturers for the handling and application of their products.

Cover the treads and risers of a stairway as soon as they have been installed and before construction traffic has a chance to

**Left: Cellar sashes should be installed after all heavy work and the building grading is fully complete.**

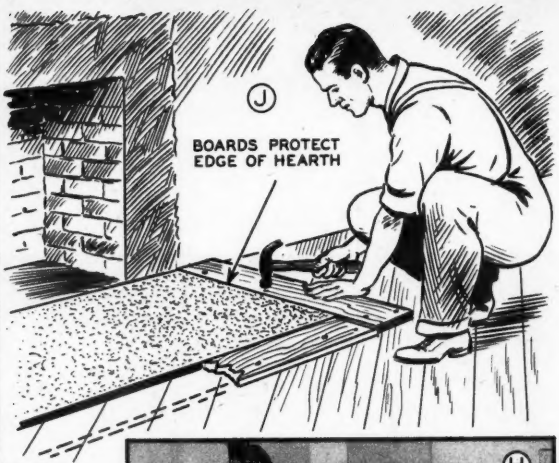
**Below: Remove expensive sashes after fitting; carefully store and install last.**

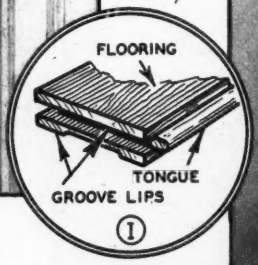
FIG. 2

soil and scuff the wood. This will save many hours of scraping and sanding that would otherwise be required to prepare the surfaces for a quality paint or varnish finish, and is good insurance against irreparable damage. Wrapping or building paper held in place with strips of wood lightly nailed with thin brads as shown in Fig. 1 (A) may be used as cover. Over this tack lengths of scrap boards to serve as temporary treads.

After all heavy construction has been completed in the house and the plastering has been done upstairs, a tarpaulin or a drop cloth may be substituted for the paper and boards (B). Keep the steps covered until the job has reached the finish stage and you are ready to install the newel posts, railings and balusters and paint the completed stair.

Newly installed frames and window and door sills should be pro-



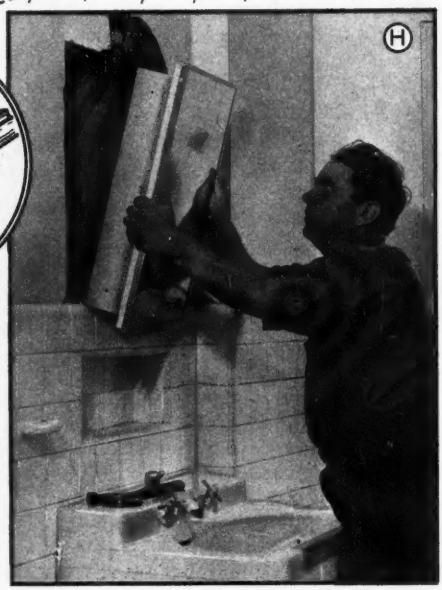




FIG. 3

**All fixtures of the breakable type should be first fitted and then removed. Permanently install the units after danger of breakage has passed.**

tected with scuff strips applied with thin nails (C). Cut from scrap wood, they will take, harmlessly, the inevitable rubbing and bumping that accompanies the carrying and passing of lumber, piping and other materials into the building.

Don't bring doors and window sash into the house until the plaster is dry, as moisture absorbed from wet plaster may cause them to swell and warp. In case freezing weather makes it necessary to install the sash immediately, leave the label stickers on the glass or soap it as a warning to workmen that the openings are glazed. See Fig. 2 (D). A priming coat of paint will go a long way toward protecting the sash from dampness under these conditions. To avoid damaging cellar sash (E), do not put them in until heavy work in the cellar and grading around the building have been completed. Sashes, containing expensive decorative glazing (F) should be removed after they have been fitted in the frames, and stored in a safe dry place until all danger of breakage has passed.

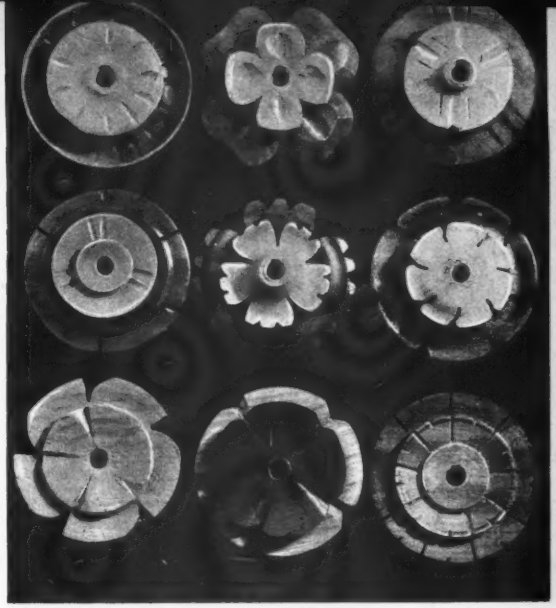
Door mirrors, glass shower doors illustrated in Fig. 3 (G), mirror bathroom cabinets (H) and other glass fixtures should also be protected in this manner.

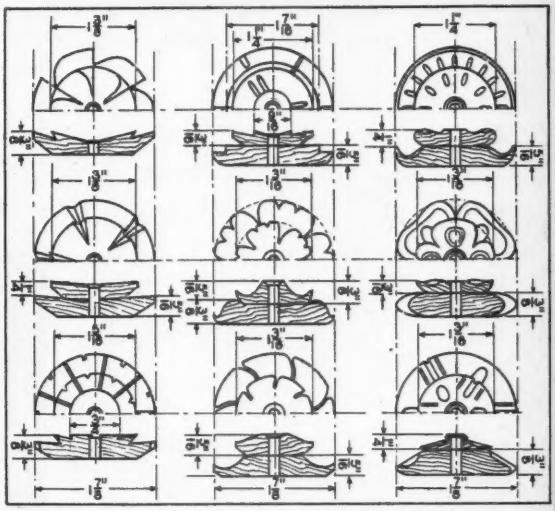
Finish flooring should not be laid in a building while the plaster or fireplace brickwork is damp. In fact, it should be one of the last materials installed and should not even be brought into the house until the [*Continued on page* 154]

# Turned Lapel Trinkets

HARDWOOD scraps of contrasting colors can be quickly converted into novelty lapel ornaments. Cut squares from ½ in. wood, mount on a screw center, and turn to shapes illustrated. After forming the face of the disc, cut in from the edge to shape the back. Sand, remove it from the center, and complete by splitting off the waste and dressing the back on a sanding disc.

Use a scroll saw to divide the petals. Decorate with vee chisel cuts in combination with a flat chisel and then glue the two parts together. Bar pins designed for such wooden novelties are on the market, but small safety-pins do just as well. Groove the backs and cement the pins in place.





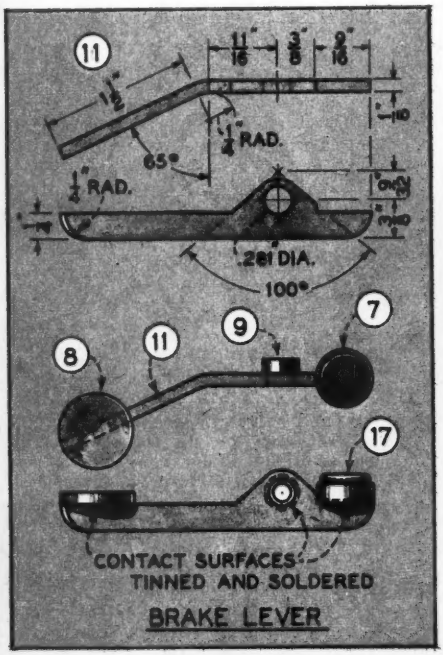
**Turning the back of a button. Spear-point and skew chisels are used. Below: A simple jig with stop blocks as shown, is useful when carving.**

**Cutting the groove for the safety-pin holder. The tool is merely a nail with some notches filed along the head. Operate at high speed.**

# Trolling Reel

BY J. C. MAGEE

**Do the big ones get away because of light tackle? Here are plans for a really heavy-duty trolling reel.**




Counterboring the holes in the duraluminum side plates. Holes are 7/8 in. in diameter.

AFTER a few big ones got away because of light tackle while motor trolling for pike and lake trout, I decided to use a heavier line. The regular size fishing reel would not hold sufficient heavy line for trolling; it was necessary to design a different type of reel with more capacity. The reel described in this article is the result. It should meet many anglers' needs.

This reel is a single action reel and will hold over 100 yards of 30 lb. test, braided linen line. Taking advantage of the positive brake, it is possible for a single person to troll either fast or slow using an outboard motor. The reel handles very nicely when playing the big ones and the fact that the reel is narrow eliminates the necessity of level winding attachments.

The first step is the making of the two side plates. These are 3/32 in. thick, preferably duraluminum. Cut them to 5¼ in. in diameter and then lay out one plate complete with all holes, see drawing on page 107. Then clamp the plates together and drill eight, ¼ in. holes at a radius of 1⅞ in. from the center. Remove the clamps and bolt the plates together. Drill pilot holes and counterbore for the twelve, ⅞ in. holes required to lessen the weight of the reel (twenty-four holes all told, twelve on each plate). Drill and ream eight .156 in. diameter holes and countersink them 1/32 in., one side only.

Now, we are ready to set up the plates on the lathe. Drill the center hole to .500 in. in diameter and turn the outside diameter of the plates to 5⅛ in. Be sure to mark the plates so that they may be assembled in exactly the same position as they were when drilled. Disassemble the plates and countersink the eight, ¼ in. holes, 60° x 1/32 in. deep. This goes for both sides of each plate. The final operation consists of removing the burrs and sharp edges. Check the plates for straightness and straighten if required.

The two side plates, bolted together, are being trued up in the lathe. Plates measure 5⅛ in.

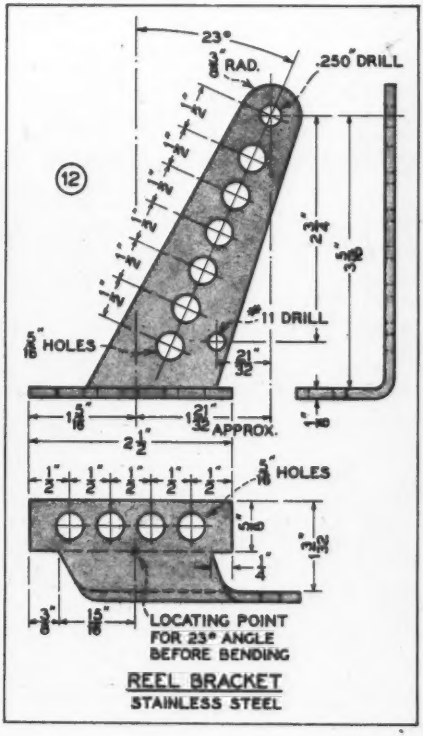
Eight reel pins made of ¼ in. duraluminum stock are required. The ends should be turned to .155 in. in diameter.

Two knob shafts made of ½ in. diameter stainless steel stock are also required. Turn and polish them to a .373 in. bearing fit and part off.

The two winding knobs are made of 1 in. diameter duraluminum stock. Turn and bore them to minus .500 in. in diameter, part off, then mount on a stub arbor and bore to .500 in. in diameter and polish all over (all decimal fits are concentric).

One reel bearing made of ⅝ in. duraluminum stock is needed. Turn this to .500 in. diameter, bore complete and part off. Then mount it on a stub arbor and turn to .500 in. in diameter on opposite ends. Be sure to remove all burrs.

The reel shaft is made of ¾ in. stainless



**Riveting the reel pins. Support the plates to avoid distortion. Rivets should be filed flush.**

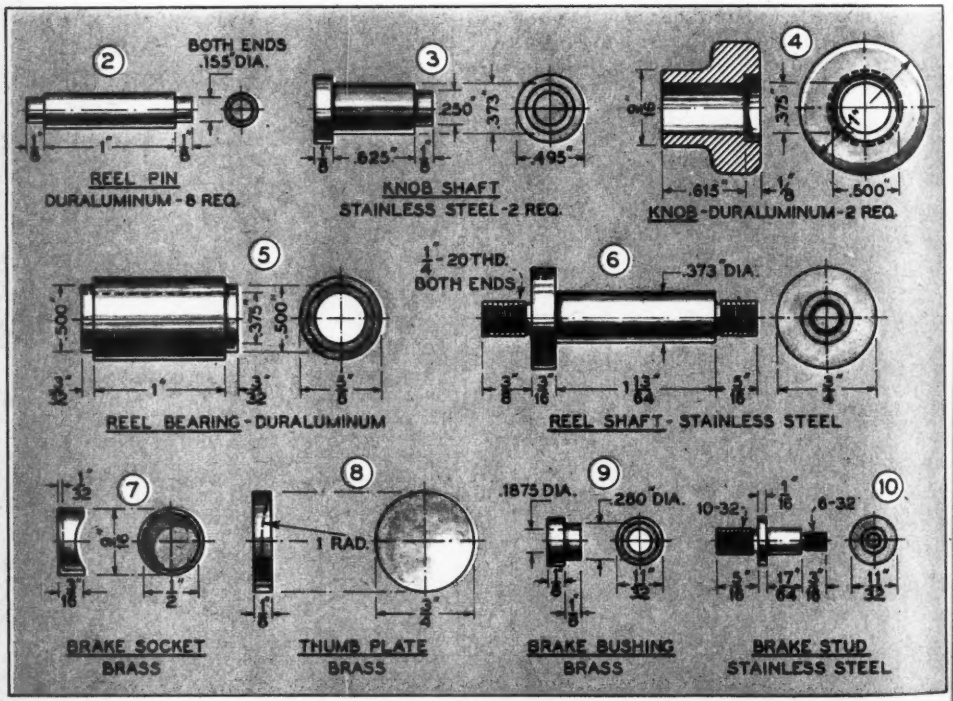
steel stock. It should be turned to .373 in. in diameter and threaded 1/4 x 20 on each end.

The brake socket is made of 9/16 in. diameter brass stock. This should be turned and parted off and milled or filed to a 3/8 in. radius, as per drawing on this page. The thumb plate, brake bushing and brake stud are also shown in this drawing.

The brake lever can be made of 1/8 in. sheet brass. Lay it out as shown in the drawing on page 104.

The reel bracket is made of 1/8 in. stainless steel stock. Lay out the outside contour as shown in the drawing, page 105. The centerline for the 23° angle is 5/8 in. from the bottom edge and 1 5/16 in. from the left side of the bracket. Saw and file it to shape and then form the 90° bend. The hole for the brake assembly is drilled with a No. 11 drill. The position of the holes to cut down weight is not important.

The leather pad for the brake should be about 1/4 in. thick. It can be punched out of belting or shoe leather. Glue pad to socket with waterproof glue.

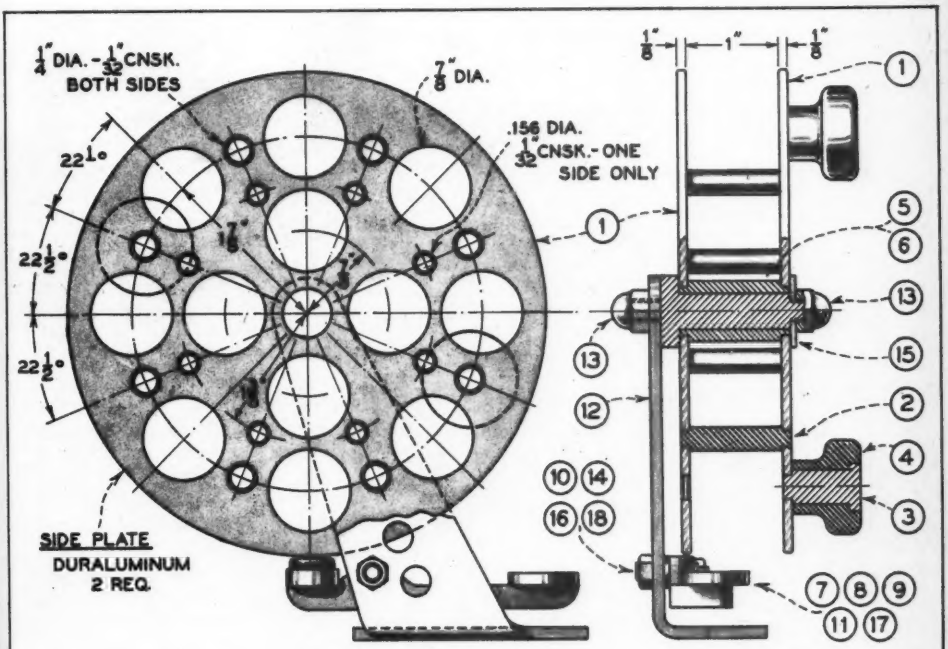


Tin the mating parts in the brake lever assembly (Nos. 7, 8, 9 and 11), clamp them in position and solder carefully.

Mount the reel assembly on the stub arbor in the lathe and adjust the side plates until they run true. Then fit the reel bracket to the fishing pole handle as shown in the photograph on top of page 104. Assemble the reel shaft (part 6) and the brake stud (part 10) to the reel bracket using parts 13 and 14. Follow the drawing for the general assembly. Be sure that the bearing surfaces are clean and lightly oiled.

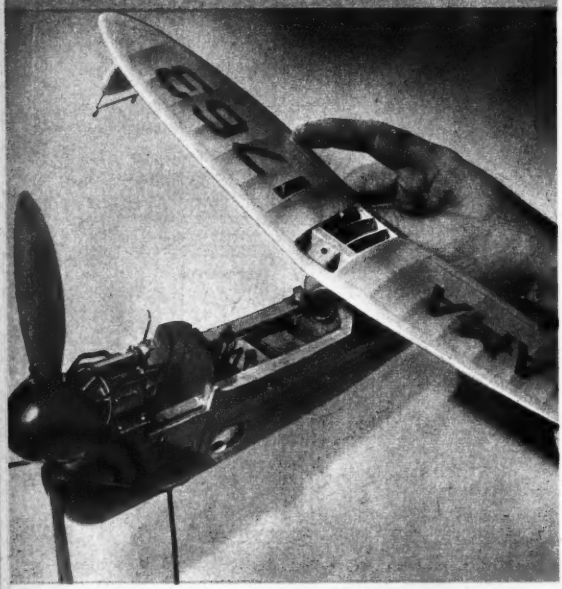
The completed reel should be inspected very carefully for any sharp edges which might catch or cut the line while in use. After using the reel, the line should be unwound and allowed to dry thoroughly. The line should then be wound back on the reel loosely so that it will retain its original elasticity and strength.

**This photo shows the bracket and brake assembly mounted on the drop center fishing pole handle.**




GENERAL ASSEMBLY

For easy hauling to and from flying sites, the wing can be quickly removed by loosening two bolts.




Photos by Stan Mangione

# DOODLEBUG

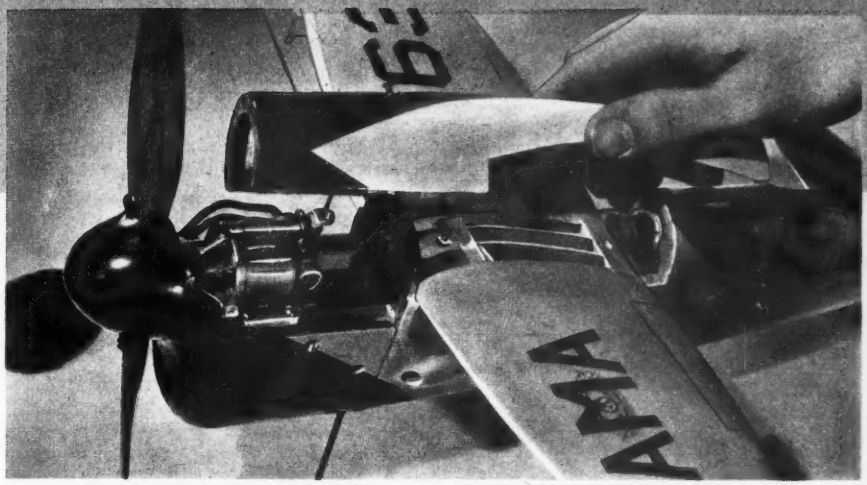
**From deep in the heart of Texas comes this sleek 95 mph control-line model designed for the novice fan.**

**BY W. J. MORAN**

*San Antonio Gas Model Association*

AS A Class B combination speedster-trainer, the Doodlebug is the proud possessor of a very impressive record—both for speed and as a trainer. Designed to reach the happy medium between speed, durability and constructing simplicity, the original model has been "soloed" by many new "pilots"; has clocked over 95 mph using an Ohlsson 23 and a special hand-carved walnut propeller. Even more noteworthy, however, is the fact that the original model has not suffered a major crack-up after well over two years of all-weather flying!

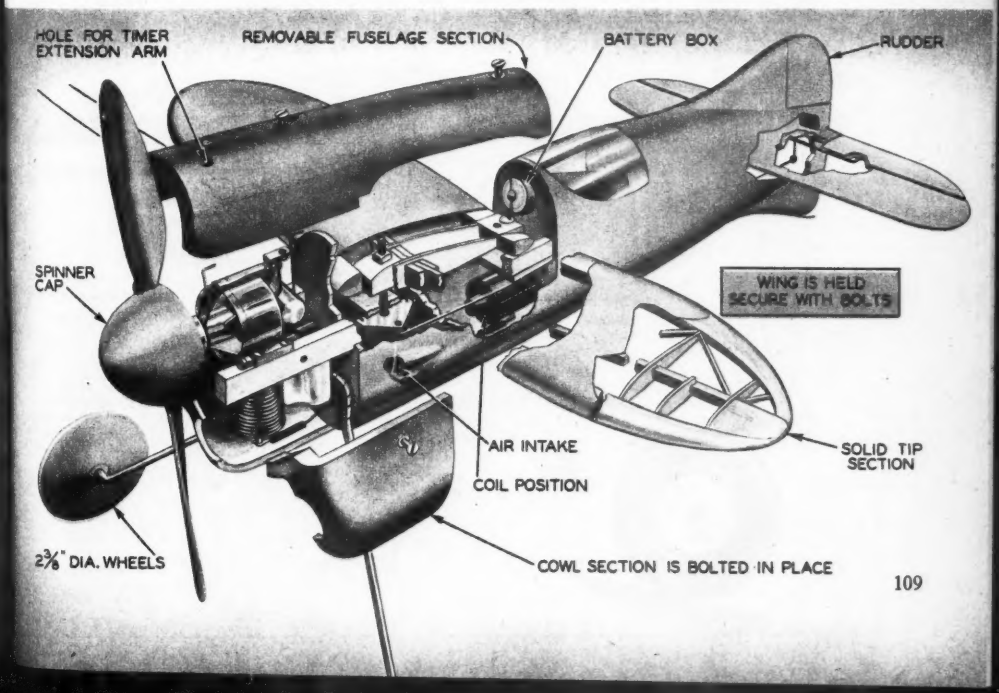
Prior to actual construction, obtain full-sized drawings by either enlarging the plans presented on these pages or else sending to the MI Reader Blueprint Service for actual size plans. Once the plans are obtained, study them carefully, noting the construction method of the various members. Commence construction by cutting the fuselage "crutch" from pine, spruce, birch or magnolia. The writer used the latter wood and found it ideal from both the strength and workability standpoints. In shaping the crutch, note that the forward portion acts as the motor mount and is cut to fit up against the front plywood bulkhead. Once the crutch is tapered as

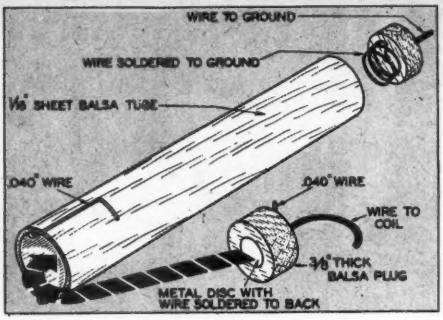



**The entire top fuselage section back to the battery case is removable to facilitate engine, battery and wing removal. Note air intake hole.**

shown, cut out the bulkheads from the indicated stock and cement in place. Add the keel section and proceed to anchor the landing gear in place by first drilling a series of staggered $\frac{1}{16}$ in. holes in the bulkhead where the wire rests. With linen thread or iron wire, "sew" in a criss-cross manner until about six strands of thread or wire pass through each hole. Apply plenty of cement over the wire and set aside until dry.

Next, cut the stabilizer from $\frac{3}{16}$ in. sheet balsa and carefully carve both sides until a perfectly smooth, streamlined airfoil exists. Now sever the elevator sections and hinge the surfaces. Any accepted way of hinging may be used although the rather novel and very successful method of using two small fish-hook eyes has proven very satisfactory.



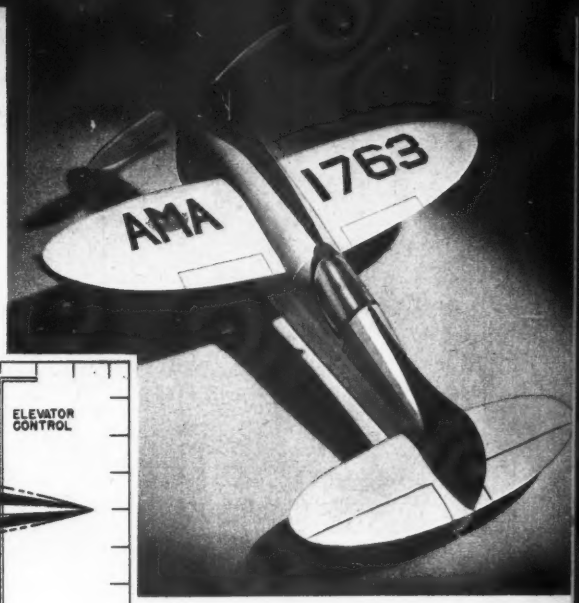



Once the hinge is operating smoothly and the elevator horn secure, cement the surface to the bottom of the crutch.

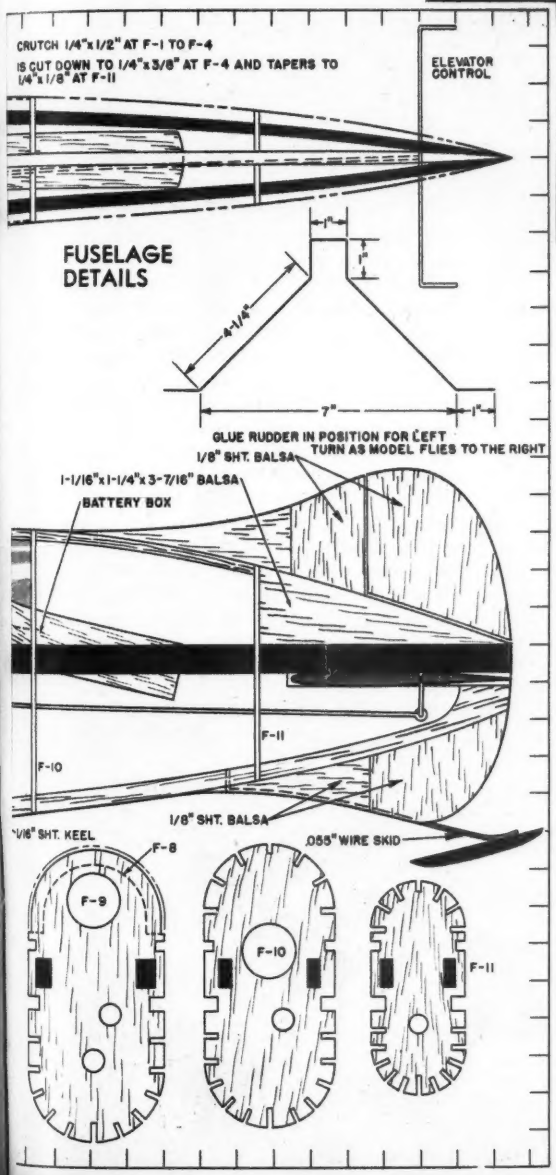
The battery box is of the tubular type and holds two penlite cells. Ray-O-Vac units, because of their leak-proof nature, are ideal for use in this type case because, in a few instances, leakage of ordinary cells resulted in swelling of the tube and making re-

1/2" SQUARES MADE BY CONNECTING OPPOSITE POINTS
CONTROL WIRES
CONTROL PIVOT PLATE
3/8" DIA. RUBBER TUBE
1/4" DIA. ALUMINUM TUBE
BALSA FAIRING
1/8" PINE MOUNTING PLATES
BASS OR PINE CRUTCH
8-3/4" DIA. PROPELLER
F-1 F-2 F-3 F-5 F-7 F-8
CUT TO FIT WING
PLANK COWL WITH 1/16"x 3/16" STRIPS OF BALSA
TIMER POINT CONTROL .055" WIRE
SMALL SCREW
SOLDER NUT TO ANGLE FOR ATTACHING BOLT
CONDENSER
BOLT IS CONTROL PIVOT
FLAT HEAD
ROUND HEAD BOLT
1-1/2"x 2" BALSA SPINNER
F-4 F-6 F-9
COIL
BIND AND GLUE LANDING GEAR TO FIRE WALL WITH WIRE
HIGH TENSION LEAD
3/32" DIA. WIRE
2-3/8" DIA. RUBBER WHEELS
F-2 F-1 F-3
F-6 F-5
F-3,5,6,8,9 1/8" SHT.
F-4 1/8" SHT. PLYWOOD
F-1,2 1/4" SHT. BALSA
F-10,11 1/16" SHT.
ON F-4
ON F-6
F-4
F-7
F-7 LAMINATED 1/8" SHT.

placement very difficult. Form the tube by wrapping a piece of flexible $\frac{1}{16}$ in. sheet balsa that has been thoroughly soaked in warm water, around a $\frac{5}{8}$ in. diameter dowel. Hold the wood in shape by binding with a strip of cloth or gauze, removing the latter only after the wood is dry. Once removed from the dowel, cement the seam together and cover the



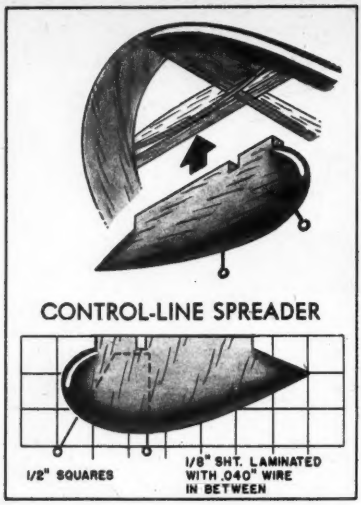

Clean design of Doodlebug is shown by the elliptical wing and tail surfaces.

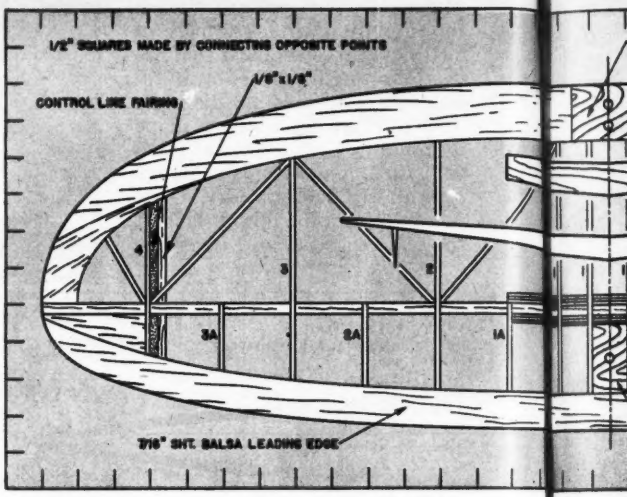



tube with tissue paper. Cut the plugs to shape and after long wire leads have been soldered to each cap, attach the plugs as indicated. Now cement the tube in place, install the control and wiring systems and finally cement the $\frac{1}{16}$ in. x $\frac{3}{16}$ in. stringers in their respective notches.

To gain access to the engine, batteries and control plate and also to remove the wing, the extended upper and short lower cowl sections are removable. First form the lower cowl from separate pieces of sheet balsa spot-cemented in place and then carve the exterior to fit in with the fuselage lines. Once shaped, cut the cowl away, split at the center and carve out the inside to fit the particular engine used. A $\frac{1}{4}$ in. wall is not too thick; will add no noticeable weight.

Formation of the upper cowl section is started by spot-cementing the bulkhead halves in place and then planking the area with $\frac{1}{16}$x$\frac{3}{16}$ in. strips. While adding each plank, take care so as not to cement them to bulkheads F-4




and F-9. Once in place, sandpaper the surface smooth and cut away along the spot-cemented joints.

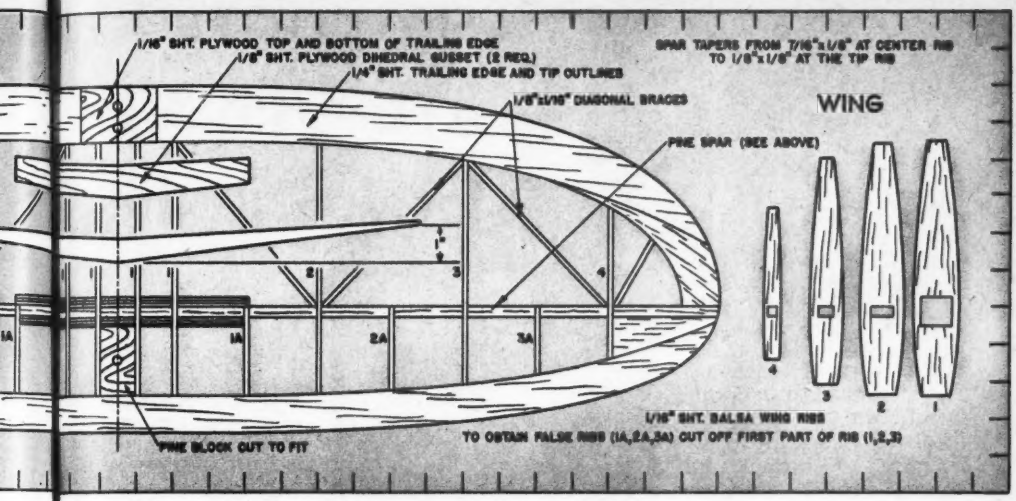
The fin and rudder should now be cut from 1/8 in. sheet stock, shaped and cemented in place. The model flies counterclockwise, or against the torque, so offset the rudder about 1/8 in. to the left to insure taut control lines when flying against a strong wind.

When using an Ohlsson 23 power plant extend the air intake tube to the side of the nose, as shown in the drawing. Merely slip a piece of rubber tubing over the intake tube and attach the opposite end to a small length of the same diameter tubing imbedded in the fuselage side. This will make possible immediate choking which otherwise would be extremely difficult, and also increase the engine performance by providing "ram."

Wing construction is next—and last. Made in two halves, the single spar is tapered from pine or hard balsa and the ribs cemented in place. After both the trailing and leading edges have been roughly shaped from the prescribed stock, cement in place and then finish up each wing half with sandpaper. Join the panels together, add the blocks for the bolts, drill the bolt holes and the wing is ready to be covered.

The original Doodlebug was covered with silk, which is one reason why the covering is as good at this writing as it was when first applied. However, Silkspan tissue, if silk is not available, will adequately serve the purpose. When us-

Doodlebug, two years old. Note timer arm extension, needle valve and control lines.

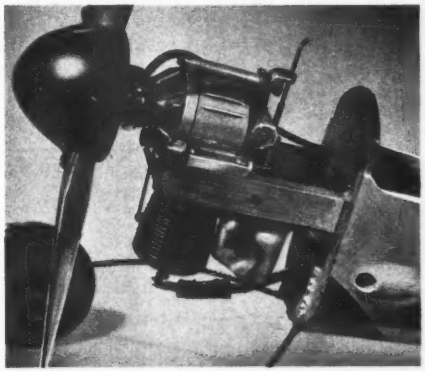



ing any Class B engines the model should balance at a point about 35 percent back from the wing leading edge. If this balancing point does not exist, vary the C. G. (Center of Gravity) through the use of lighter or heavier wheels. In the case where large Class C engines are used, it is suggested the power plant be mounted in place before the wiring is completed and the coil shifted to obtain the desired C. G. position. When the Center of Gravity adjustment is slight, the battery case may be shifted.

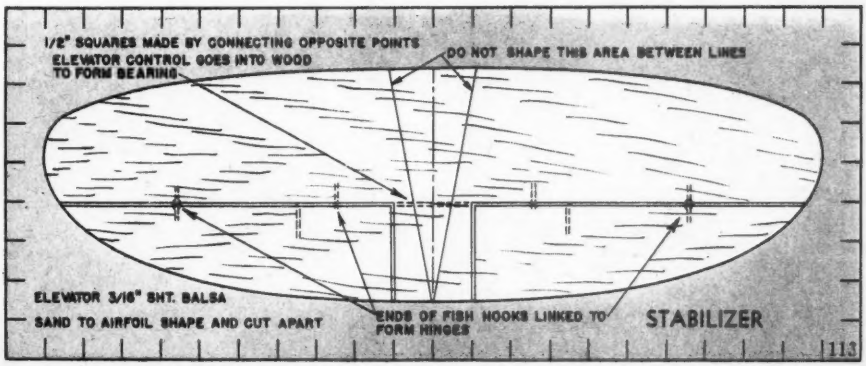
Flying Doodlebug is no different than flying any simple control-line model, except that it may be much easier to handle. For the novice—or for the speed-dizzy modeler—the Doodlebug will perform ably. After all, the Eyes of Texas Are Upon It!

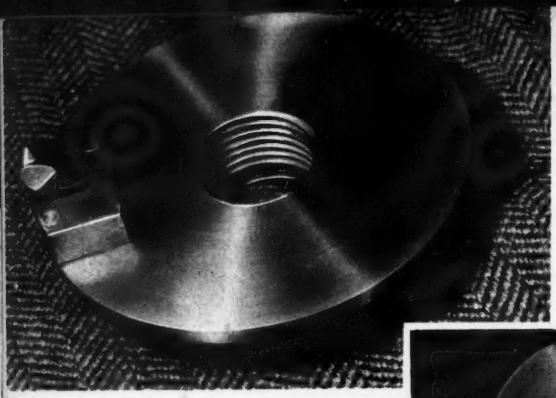
**FULL-SIZED PLANS**

are a must if you plan to build this model. For complete information turn to page 156.

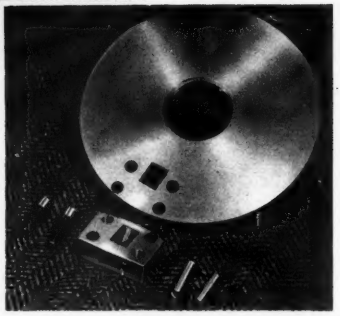


Right: Nose with cowl removed. Spinner cap is carved from balsa and screwed to prop.





# FLY CUTTER ATTACHMENT for your Lathe

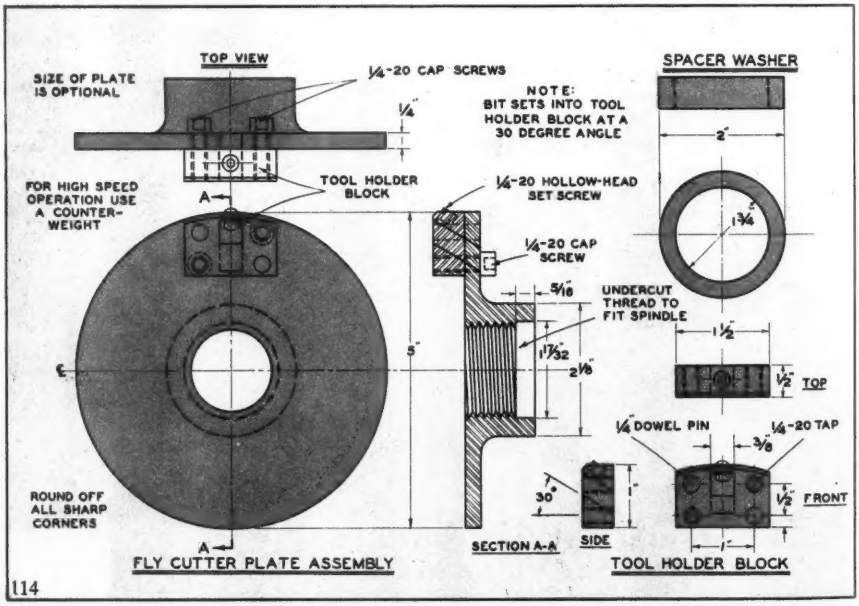


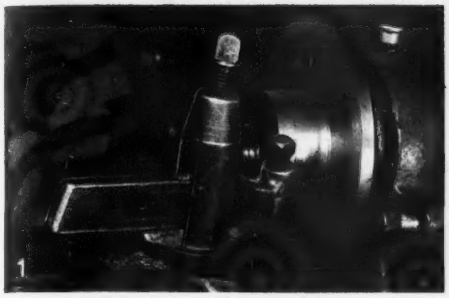
BY AL SPAMPANI

**Upper left: Completed attachment. Left: All parts except the tool bit prior to assembly.**

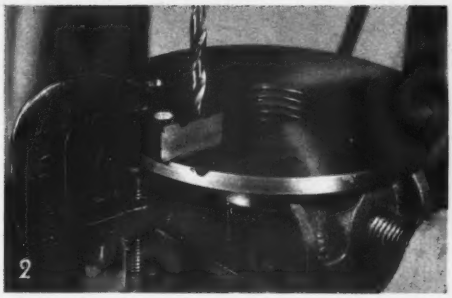
MANY times the home craftsman is confronted with a milling job involving facing an irregular object which cannot be held in a chuck, or is just not practical for lathe turning. Motor bases, cylinder blocks, or other planing jobs can be handled in a more practical and efficient manner with this fly cutter attachment. You no doubt have, at one time or other, consumed many hours facing with an end mill. The cut is limited to the diameter of the end mill, which in turn necessitates making many cuts. The fly cutter puts an end to this monotony. A plate 5 in. square is easily faced in one pass of the cutter, resulting in a smooth, true job and simultaneously saving considerable time.

The fly cutter consists of three major parts, (1) the cutter plate, (2) the tool holder block and (3) the carboloy cutter. A rough plate casting may be purchased from any hardware or machinist supply house for but a few cents. A casting





After casting is drilled, bored, threaded and the front faced, reverse and proceed to machine back.



Clamped in a tilting vise set at a 30 degree angle, tool bit hole is first drilled, then filed.

for a chuck back plate or lathe face plate will do nicely. In making the attachment, first make a plug gauge from 1½ in. diameter mild steel having the same thread as your lathe spindle.

Hold the plug gauge stock in the three-jaw and thread, using the small face plate supplied with the lathe as a ring gauge to fit the plug. Chuck the plate casting and then face the back boss. Bore and thread the boss to fit the plug and undercut the first three threads to allow the plate to be screwed up against the spindle shoulder. Then screw the plate on the lathe spindle and face.

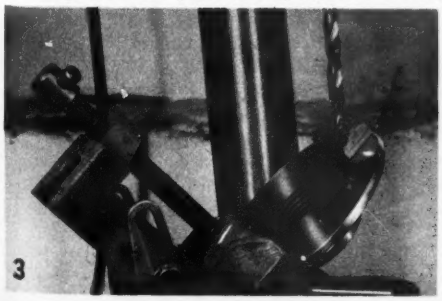
Remove the plate and make the spacer shown on the plan. The small spacer should take up the space between the end of the spindle threads and the spindle shoulder. Place the spacer on the spindle and screw the plate in place. Turn down the back of the plate and the outside diameter to the dimensions indicated.

The next problem is machining the tool holder block from cold rolled steel. First lay out the small block and drill all holes. Two of these holes are for the ¼ in. dowel pins and are drilled 15/64 in. before being reamed. Drill the other two holes with a No. 7 drill and tap ¼-20. Do not drill the tool bit hole until the tool block is fastened to the plate.

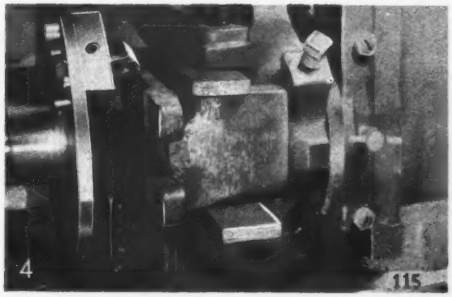
Locate the tool block on the face plate and clamp in place. Spot-drill the holes, remove the tool block and drill the plate. Thread the block ¼-20 and fasten the block to the plate. Now ream the two pin holes. The pins will always hold the block in position, thereby eliminating block movement when the plate is in operation. Screw the plate on the lathe and turn the tool block to the same diameter as the plate. Chamfer the block 45 degrees and proceed to cut the tool bit slot.

Cutting the tool bit slot must be done with extreme care. Clamp the assembled unit in a tilting vise and set the vise at 30 degrees. Center drill and then drill through with a $\frac{3}{16}$ in. diameter bit. A ⅜ in. counterbore with a $\frac{3}{16}$ pilot is used to start the hole. Once drilled, file the hole to fit a ⅜ in. tool bit. The best way to fit the tool is to file the hole square until one side is about 1/64 in. left, then use a ⅜ in. square tool bit as a broach.

Once tool block is drilled for pins and bolts, clamp block on plate and spot-drill all holes.



Fly cutter attachment being used to face an irregular casting. Note position of setscrew.



# Lathe Tool Board

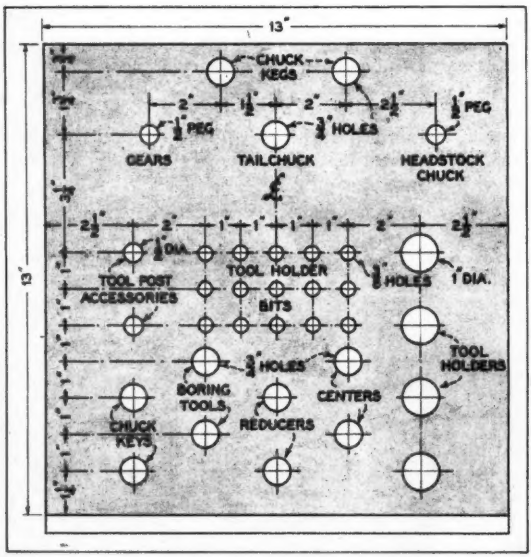
**Do you hunt all over the shop for your lathe accessories? This board will keep them where you want them—at the lathe.**

BY JACK MELLINGER

**The finished board at the lathe showing some of the accessories it can accommodate.**

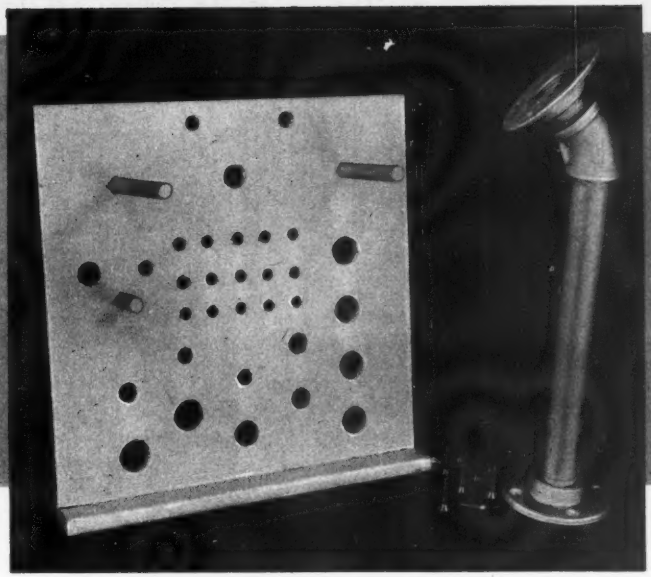
BIG production shops usually equip each lathe with a tool board on which are placed all the small tools being used at the time. These boards, mounted at an angle and set up on a pedestal adjacent to the lathe, are not only handy for the operator but they speed up the work as well. Small shop owners and home workshop fans could profit greatly by taking advantage of this idea.

Described here, is this type of board; it accepts chucks, keys, wrenches, tool holders, bits and even threading gears. There is a place for most of the frequently used items.




Get a maple board 1¼ in. thick and 13 in. square and on one edge fasten a lip made of ½ x 2½ in. maple. This lip will be at the bottom and is designed to catch anything that slides down the board. Plan what you want to put on this board and drill the required holes. Certain accessories, such as gears are mounted on pegs. The drawing will give you some idea of what can go on such a board.

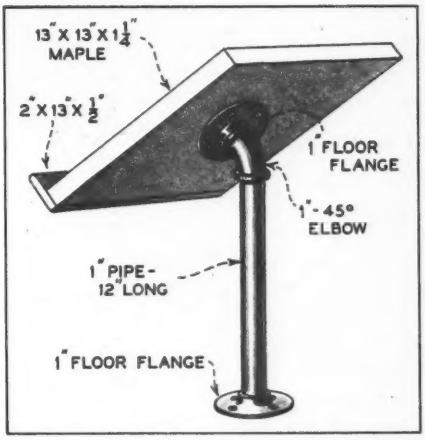
Next, get two floor flanges, a 45° elbow, a short nipple and a 12 in. piece of pipe, all 1 in. size. Mount the top flange on the back of the board and then the whole arrangement can be mounted on the same bench

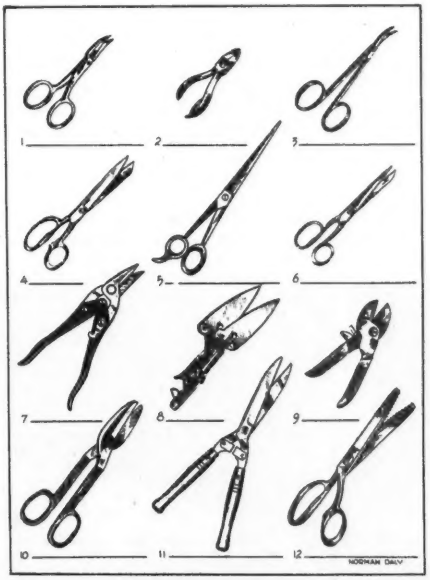


All the parts needed for the board. The number and size of the holes and pegs should be determined beforehand and varied to meet your particular requirements.

as the lathe. Oil the maple board thoroughly or if you wish paint it with aluminum paint.

Now your tool board is complete and you will find that most of the tools you require are right at your elbow, easy to get at and quickly returned to their place.




## ← *Shear Knowledge*

If you're the type of person who insists on trimming your toenails with a pair of tinsmith's shears this quiz may not interest you. There is a style of shears and nippers for just about every use you can think of. Twelve are illustrated. How many can you name? Score 10 points for each correct answer. Consider 80 as passing, 100 is good and 120—well, shear luck.

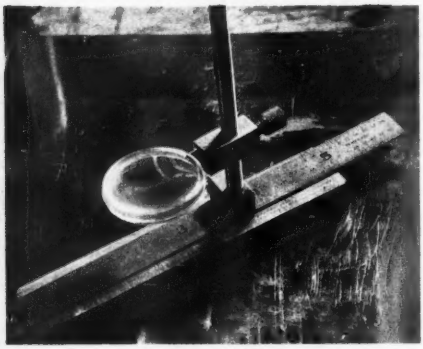
Answers on page 148

# measuring tools and how to use them

Cutting down time of trial and error when centering work in an independent chuck by using dial indicator on lathe toolpost.

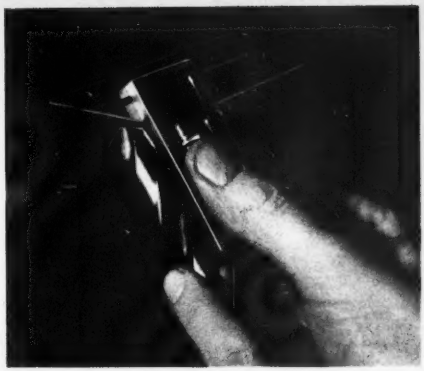
BY JOSEPHINE VON MIKLOS

AS WE indicated last time accurate measurements are the hall-marks of quality workmanship. You can lay a scale against a piece of wood, metal or plastic, and read it quickly, and that's that. But quite often you'll discover that you were "out" and when you are out at the beginning of a job, even only 1/64 in. the chances are you'll be out plenty at the end. Anyone who has done precision work knows, how miserable a mechanic feels when his job does not come within the permissible tolerance. Now, in wood or plastics the problem isn't too serious, for these materials have a certain amount of give. But even an error of 1/8 in. shows



The right way to use a scale. Measure from one inch mark to avoid the wear at the very beginning of the scale. Note magnifying glass. Below: Using a depth scale, OK for measurements up to 1/64th in.

The proper way to use a depth mike. Many mistakes occur in the beginning because scale has to be read from the bottom up.



When you sharpen your drills always check the angle with a drill grinding gage. Be sure cutting lips are of equal length.

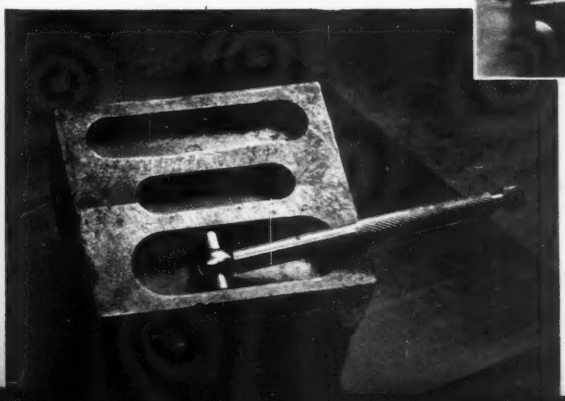
Checking size of a round piece with caliper rule; fit should be snug, not tight.

up very plainly when you make, say, a bookshelf.

For precision workmanship, we must make sure that our work as well as our measuring instruments are clean. A chip on a wood-measuring scale, a bit of plastic or metal dust between the piece to be measured and the instrument creates havoc with accuracy. Rust, of course, means death to all tools. It's a very good idea to go over your instruments regularly, particularly if you live in a damp climate, and wipe them off with a lintless cloth soaked in benzine or kerosene. Never try to file or sandpaper scratches or rust. It is safe to use crocus cloth which is so fine that it actually polishes. Commercial metal cleaners are, on the whole, not recommended for cleaning tools, too many of them contain abrasives. It is good practice to keep the more delicate measuring tools in separate chamois bags. A mike or a protractor in a soft bag will protect it from its neighbors in the tool box. If you are [*Continued on page* 154]

Using the micrometer. If mike does not read zero when anvil and spindle are together it means that wear has occurred.

When measuring screw threads it is a good idea to hold the screw and the gage against the light to be sure that the gage fits the thread.



The telescoping gage locks when the two sides hit the side of the groove to be measured. Be sure that the gage is perpendicular to the sides.

# Low Cost

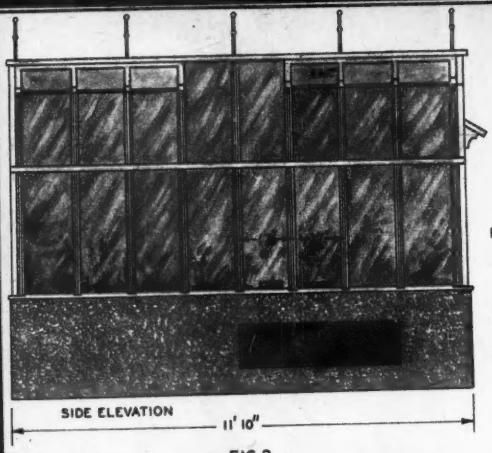



FIG.2.

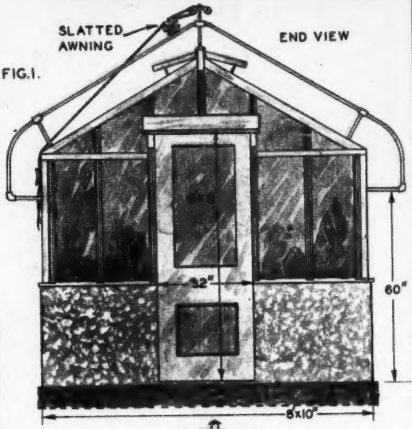
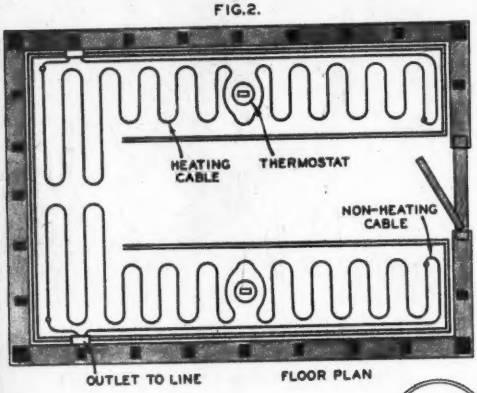



FIG.1.



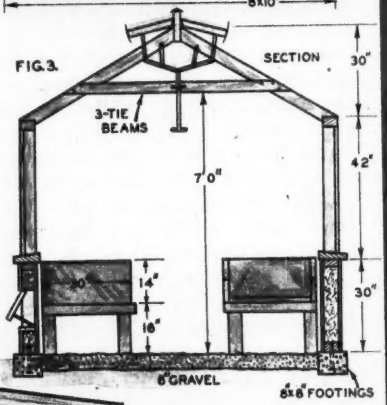




FIG.3.

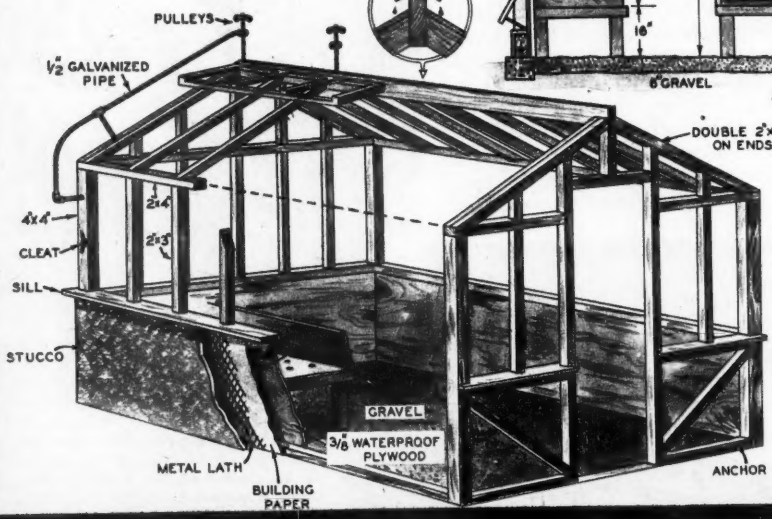



FIG.4.

# Greenhouse

THIS small greenhouse is within the scope of the home carpenter. It is designed for simplicity of construction, yet at the same time embodies features of the more expensive greenhouses, with adjustable roof ventilators, insulation below the glazed portion and electric heating cables in the plant beds.

Overall dimensions are given in Fig. 1, showing the compact proportions. There are two roof vents on each side, and one on each side at opposite ends near the floor, with a screen on the inside to keep out rodents and insect pests.

In the floor plan, Fig. 2, is shown the arrangement of the lead-covered heating cables and locations of the two thermostats which operate on independent circuits. Note that the heating cables are laid at least six inches from the thermostats, this also being the distance between the cables all through the beds.

A sectional view, Fig. 3, illustrates the lower vent, the operating mechanism of the roof vents, tie-beams and the capacious plant beds. Underneath the last is space for compost bins, tools and the like.

Construction is shown in detail in Fig. 4. Corner posts are 4 x 4 in. beams, studs and rafters 2 x 3 in. stock. The window sill rests on a 2 x 4 in. beam. For the ridge piece use a 2 x 8 in. beam and cap it with galvanized sheet iron extending two or three inches, to protect the hinged joints of the ventilating sash. Note that the rafters do not extend beyond the edge, but are flush at the eaves and are double at the ends. If you intend to have a roll-up, slatted awning, install pipe rails as shown, with an extension for the shade pulleys and cleats to secure the cords when in the rolled-up position. The sides below the [*Continued on page* 146]

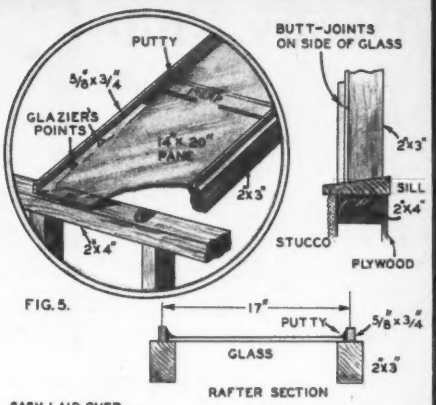



FIG. 5.

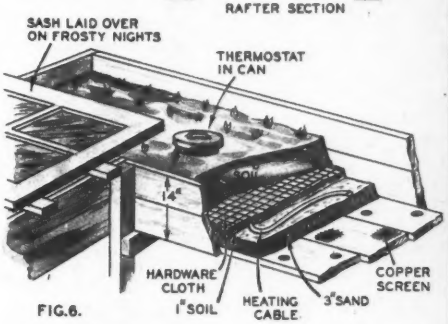
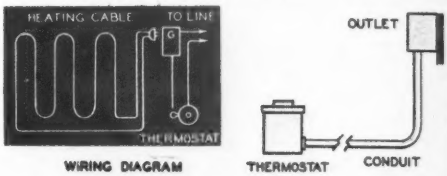



FIG. 6.




WIRING DIAGRAM

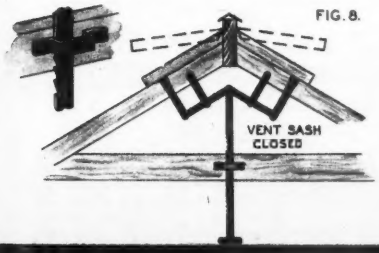
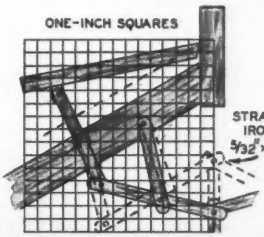



FIG. 8.



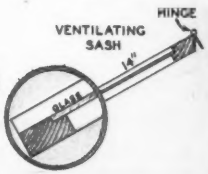




FIG. 7.

# Hobby Knife Set

**A twist of the wrist will give you a new cutter.**

HERE'S a hobby knife that can be made quickly by any owner of a metal turning lathe. The simple operations are excellent practice for the beginner and an interesting evening's diversion for the expert who likes to make his own tools.

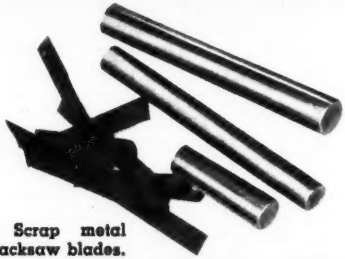
A few minutes' study of the diagram and illustrations will show the basic principles of the knife's design. The material used in making the knife shown was cold rolled steel, although aluminum or brass may be used.

## THE HANDLE

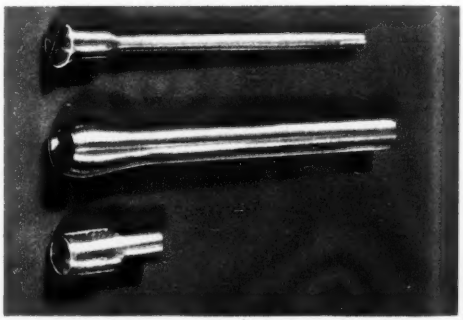
The barrel is turned to shape between centers and polished with emery cloth. It is then cut to length and both ends are faced, holding it in the scroll chuck. The center is then drilled out all the way through. The inside edge of the head should be slightly rounded and polished so that it will slide up the bevel of the blade clamp when tension is applied.

The shape of the handle is a matter of preference. The bolster head shown provides excellent down pressure. Grooves can be cut to provide a gripping surface.

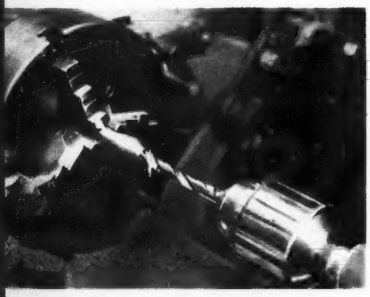
The barrel can be perfectly straight with a knurled grip, flat-sided grip, or hexagon-shaped grip. Its dimensions can be altered if desired. The blade clamp is turned to shape [*Continued on page* 148]



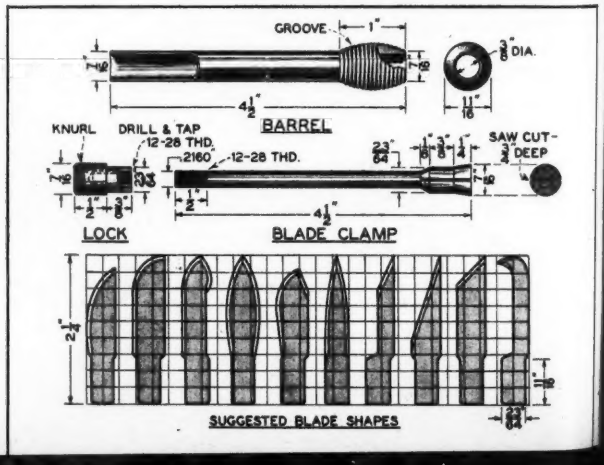
**Material: Scrap metal and old hacksaw blades.**



**The three pieces which form the handle (barrel, lock and clamp) are easy to turn and machine.**



**Be careful in drilling the hole in the barrel; it must be true.**



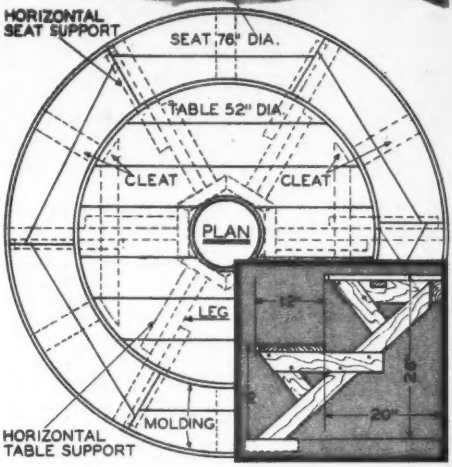
# Picnic Round Table

**Turn your back yard into a perpetual picnic ground with this unusual table.**

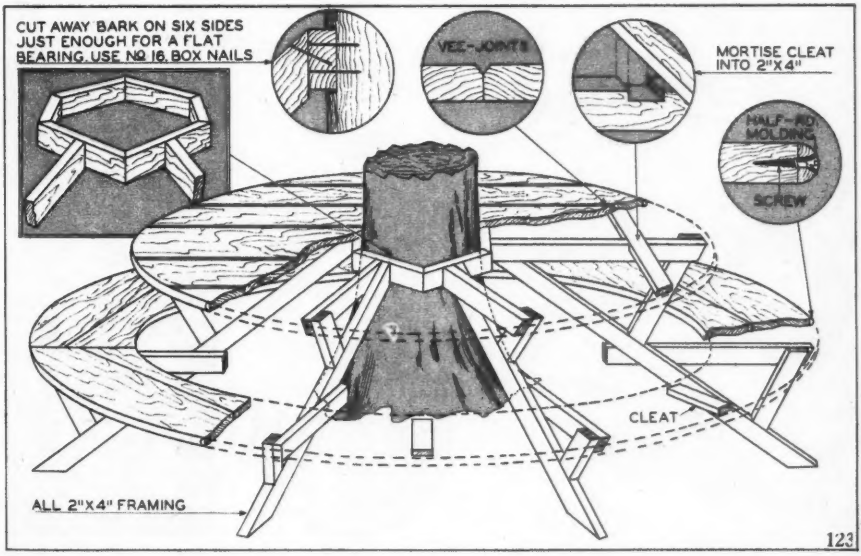
SIX husky and hungry adults can sit at this outdoor table and apply themselves vigorously to their barbecued steaks without elbow collision. One can easily climb into the low circular seat, and with the substantial bracing provided there will be no wobble under a heavy passenger quota.

The circular seats and table are braced against a tree trunk, with six diagonal legs built from short lengths of mitered 2 x 4 in. beams nailed to a hexagonal collar at the top. Six horizontal supports hold the table top and a similar arrangement is made for the seat. Boards for the latter are band-sawed from 8 in. wide planks about 1 in. thick. The top is made from any available stock material. Plane a bevel on each edge so, when joined, a vee-groove will be formed. Around the outside edge install half-round molding secured with slightly countersunk screws.

Application of a few coats of good white oil paint will add beauty to the table and retard warping and wood decay, as is often the case with outdoor garden pieces.




Plans are for a 52 in. diameter table but may be altered to meet the requirements of the builder.



# Farm Trailer

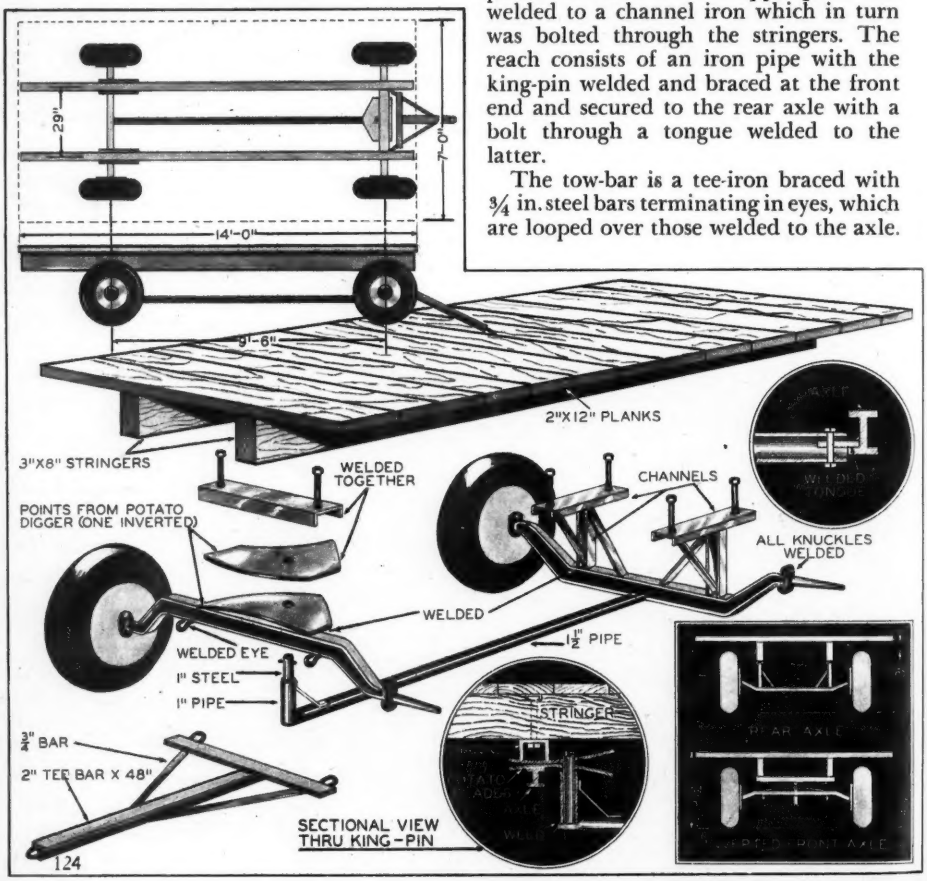
This trailer is doing trojan service at a large potato farm in Nuevo Valley, Cal.

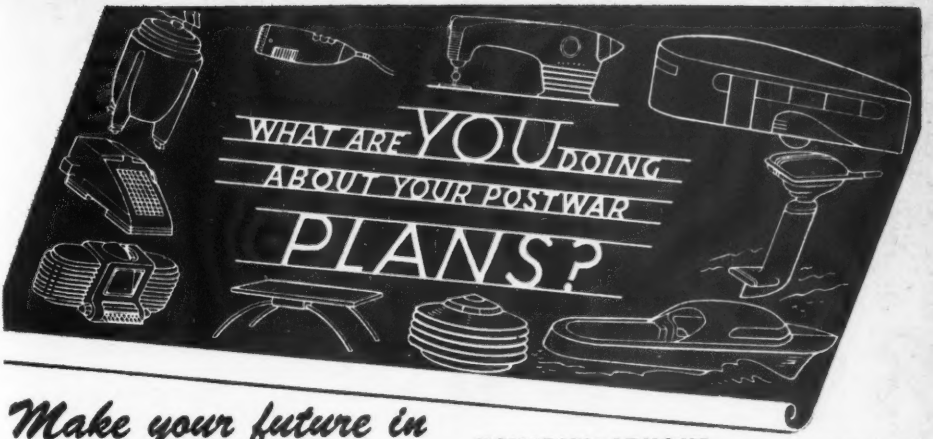
**Ease your farm chores with a low bed trailer. This one is 31 in. high.**

THIS farm trailer with a flat bed slightly over 31 in. above the ground is a great convenience whenever heavy sacks of potatoes and other produce are to be loaded in the field or onto a freight platform.

The chassis is made of used automobile front axles, steel channels, bar iron and pipe, welded as indicated. Standard wheels are used with oversize tires. A novel feature is the use of potato-digger points for the turn plate, with the king-pin just behind the front axle. Practically any front axle is suitable for front and rear of this trailer after the knuckles have been welded. In the trailer illustrated the front axle was inverted and a potato point welded to it. The upper point was welded to a channel iron which in turn was bolted through the stringers. The reach consists of an iron pipe with the king-pin welded and braced at the front end and secured to the rear axle with a bolt through a tongue welded to the latter.

The tow-bar is a tee-iron braced with ¾ in. steel bars terminating in eyes, which are looped over those welded to the axle.



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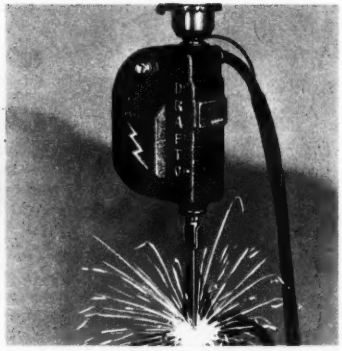
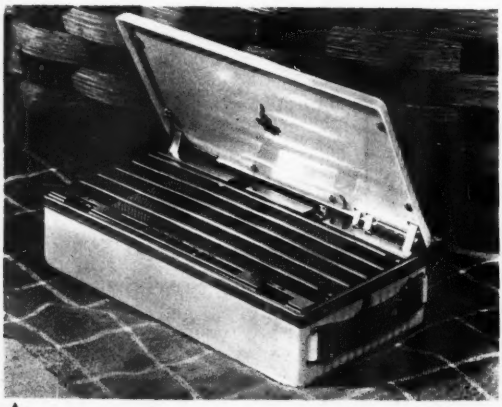
# new products
## of scientific and mechanical interest

**KAN-TRUK,** manufactured by the Dairy Equipment Co., is a labor saving device the industry should welcome. Adjustable for different size cans, Kan-Truk transports full milk cans in an upright, perfectly balanced position, thereby eliminating possible spillage and making carting and loading operations quicker and easier.

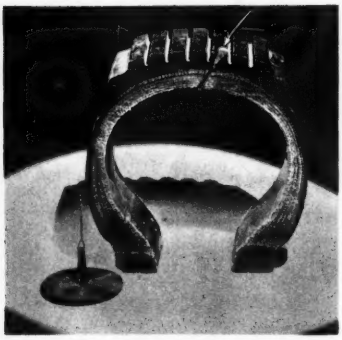
**A METAL DISINTEGRATOR** of a new and improved type is now being produced by the Drafto Corporation, Cochranton, Pa. Designated as the Model 3, the machine works on the electrical "sputtering" principle and is capable of cutting through tungsten carbide and Steelite. The tool is especially suited for removing broken taps and drills.



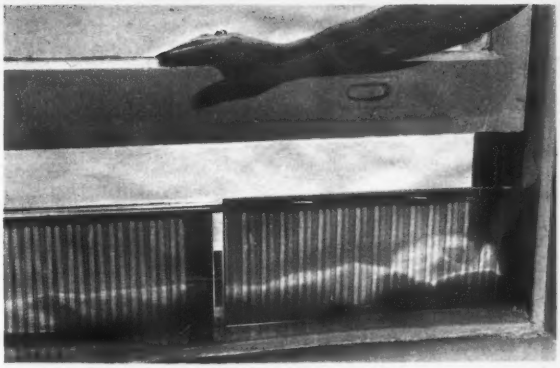


**MORE POWERFUL, MORE EFFICIENT** and more beautiful is the postwar pocket radio manufactured by the Emerson Radio and Phonograph Corporation, N. Y. 15, N. Y. Measuring approximately 8x4x2 in. and weighing but three pounds, the miniature radio features a special Tenite plastic case, molded in a multitude of colors. Manufactured by the Tennessee Eastman Corporation, Kingsport, Tenn., Tenite plastic is exceptionally light, strong and very durable. The radio complete with battery is in the $25 price category.

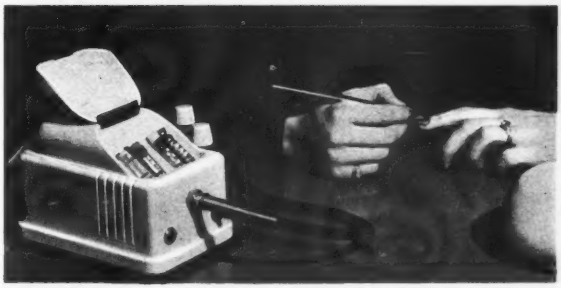
**A RUBBER RIVET,** product of the W. J. Speaker Corporation, Milwaukee 12, Wisc., insures extra service miles for all kinds of tires by filling small nail holes and breaks, thereby preventing water and slush seepage, the chief cause of fabric rot and eventual blowouts. Available in three sizes, the rivet consists of a large circular base and a rubber stem, the end of which contains a steel needle used for "threading." Once inserted, the stem end is cut off, sealing hole.

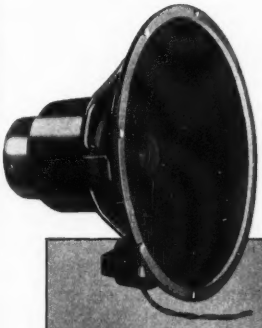


**A WINDOW VENTILATOR** that is virtually stormproof and at the same time admits large quantities of filtered air is now obtainable from most department, home furnishing and mail order stores. Called AIR-IN, the ventilator uses translucent plastic covered wire mesh in the form of baffles fixed vertically over a single layer of fine copper screening. The product is distributed by Salmonson & Co., N. Y., N. Y. ➔

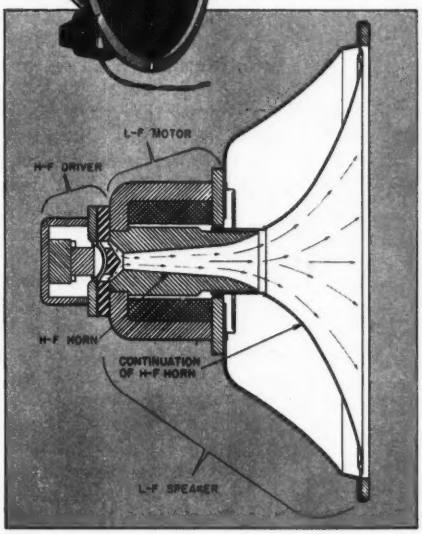


**AN ELECTRICAL MANICURING** machine is the latest development to help women improve the appearance of their hands. Produced by the Abar Manufacturing Company, Cleveland, Ohio and called the Beautiator, the machine is powered with a small electric motor and is housed in a slick Beetle plastic shell, product of American Cyanmid Co., N. Y., N. Y. ➔



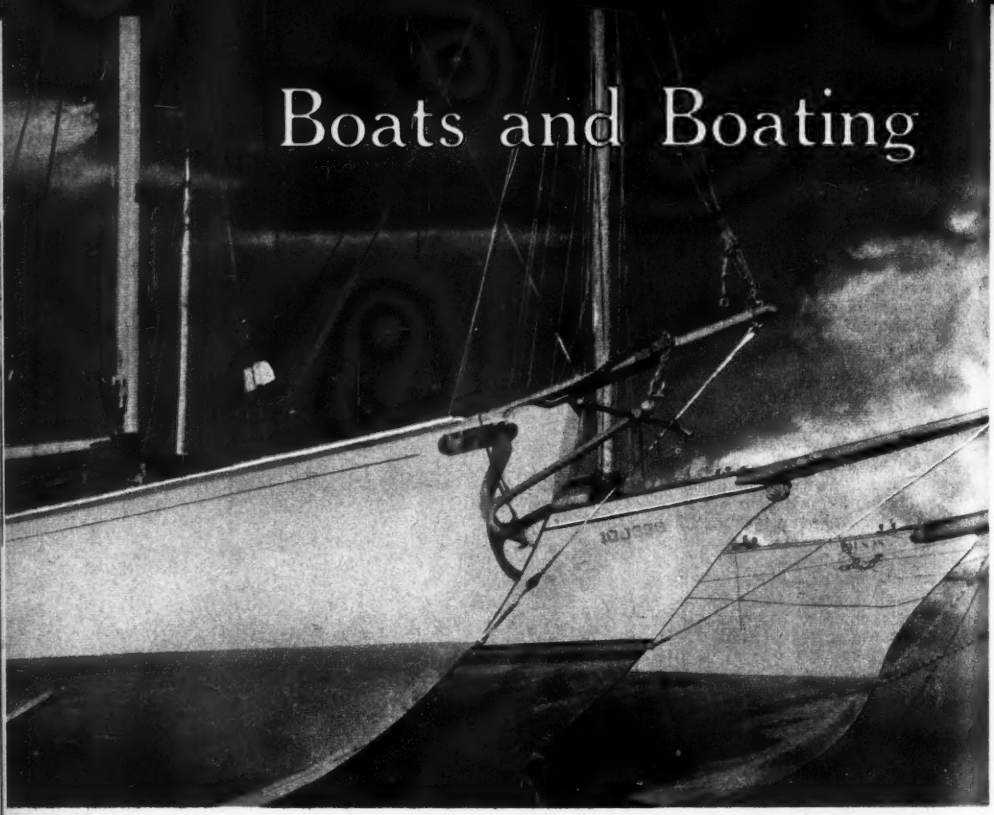


**THE FIRST OF A NEW SERIES** of Coaxial speakers is now being produced by the Jensen Radio Manufacturing Company, Chicago, Ill. The new speaker provides the quality of reproduction so desirable and essential for home radio receivers and phonographs—particularly for FM reception and high quality phonograph reproduction. Complete information is available from the company. Request Data Sheet TD-132.



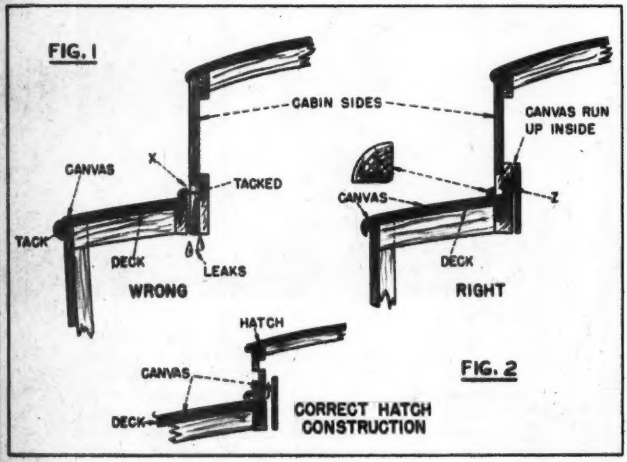
**SALMON, MUSKIES** and other big game fish go for these fish lures molded from transparent Tenite plastic by the Martin Fish Lure Company, Seattle, Wash. Fresh bait is thrust headfirst into the plastic and skewered by means of two projecting wires and two fishhooks. The lure possesses both buoyancy and light weight, is extremely tough.

# Boats and Boating



BY WILLIAM F. CROSBY

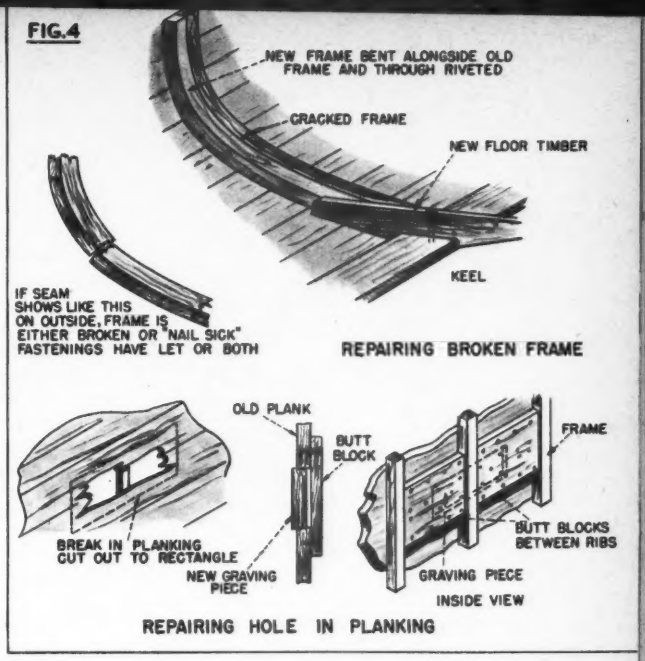
**Buying a used boat and making the necessary repairs is always a ticklish proposition. Let MI's boat expert guide you on both phases.**




THIS month we are going to devote ourselves to older boats, not necessarily antiques, but boats that have been used for several years and which you, as an ambitious yachtsman, are about to buy and "fix up." Of course, there are many good used boats, but there are also some awful "crates" which require a great deal of repair work to make into tight little buckets. Generally speaking, the rule is to beware of used boat bargains and if you are in doubt, pay someone who is experienced to make a complete survey before you put any money on the line.

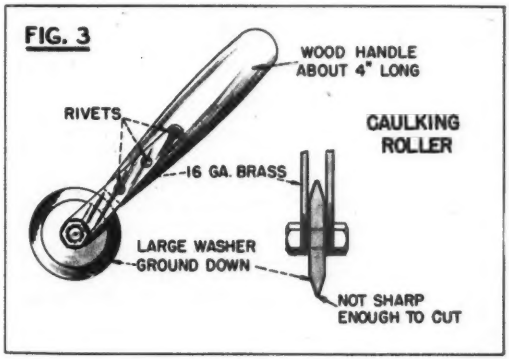
The chief enemy of boats is dry rot. It is a disease of the wood and once it gets a good start, it is apt to spread far and wide and there may

be virtually no wood at all underneath several coats of paint. The places to look for dry rot are in the extreme ends of the boat, up under the forward deck and way aft right up by the transom. If the boat has a built-in ice box, the space between the box and the inside of the planking is another place to pay particular care. In fact, dry rot may appear almost anywhere in the hull but is more apt to flourish where the hull is closed in and where it is not properly ventilated. Fresh water, particularly rain water, is the chief cause. A little of this water, no ventilation, plus a hot sun on deck to raise the temperature below, and dry rot can start in a very short time even in a new boat.

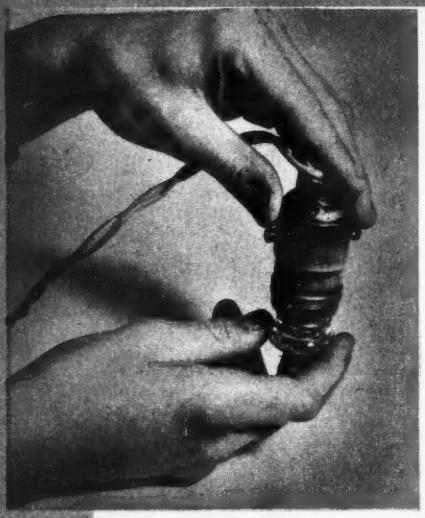



Before you buy any used boat, make the owner have it hauled out for inspection. Walk all around the outside and examine the hull carefully. A small knife blade may be poked at a suspicious area. If the knife goes in more than $\frac{1}{16}$ in. you may have a "soft spot." If the knife goes into the wood up to the hilt, you know there's trouble and if both knife and hand go clean through, don't buy the boat! Pay particular attention to the bow and stern and also along the waterline for the place "between wind and water" is also apt to cause trouble. The garboard strake, the plank next to the keel on each side, should also be carefully checked. Look at the condition of the seams and see if the planking is fairly smooth. If the edge of one plank sticks out, look on the inside of the hull for a broken frame. Go inside anyway, and poke your knife blade into some of the frames. Take hold of a frame here and there with your hand and see if it is loose. In one boat examined when this was done half the frame came out "by the roots." It was full of dry rot.

Planking is also apt to get "nail sick." This may apply to any kind of fastening, screw, nail or rivet, and is generally due to improper sealing of the plugs or bungs over the fastening heads on the outside of the planking. If the bung is not tight, water may get in back of it and start dry rot to the point where the head of the fastening has no hold at all but is surrounded by soft, punky wood. The fastening head may be drawn right through the wood. In time it will get so bad that the entire plank will have to be replaced, for no matter where you put a new fastening, the wood is still too soft to make it hold. Of course, the same thing may happen on the inside of the hull where the rivet burr is made on the frame. There may be spots where the water can lie and start rot and [*Continued on page* 144]

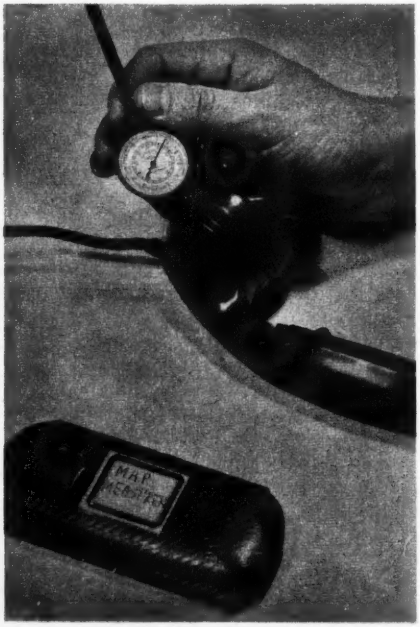


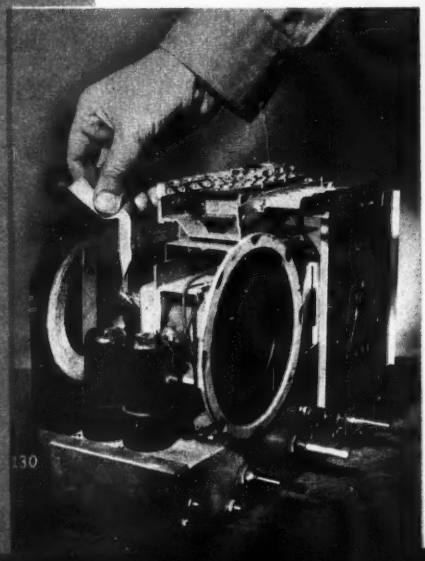
# radio *and* electrical *Ideas*



EMERGENCY SWITCH. An ordinary lamp socket of the pull-chain, key, or push switch type can be converted into a switch by simply inserting a short-circuited plug or fuse into the socket. The two terminals of the socket are then used as the leads for the switch. This stunt works particularly well when a pull switch is needed with a long "pull," such as under cellar stairs or in a high closet. Just tie a string to the chain of the socket and extend it. ←

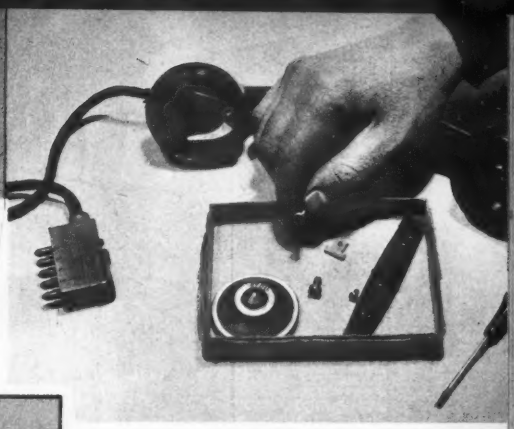
MEASURING IRREGULAR SURFACES. A map measurer (a small geared, direct-reading indicator for linear dimensions) is usually regarded as a drafting-room tool. However, it is just as useful in the shop for measuring irregular surfaces. For example, it can be used to figure the area of objects to be plated and for determining the amount of masking tape needed for spray and paint jobs. →

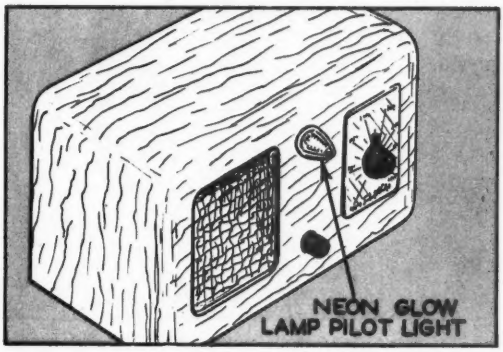


NOISY RECEPTION IN A RADIO SET is sometimes due to the loosening of the loop aerial from its support. All you need to correct this trouble is a bit of adhesive tape. Tape the hank of wire securely to its fiber or cardboard support as shown. Taping all loose wires to some support is a good idea generally to prevent possible shorts with the chassis. ←

**SAFEKEEPING SMALL PARTS.** It is very easy to lose small screws, nuts, and washers when working on radio and electrical equipment. One way to avoid this headache is to keep a supply of flat cardboard or tin boxes on hand. The boxes in which cut film is packed are ideal for this purpose. The old style "flat-fifties" cigarette tins are even better for this purpose with compartments added. ➔

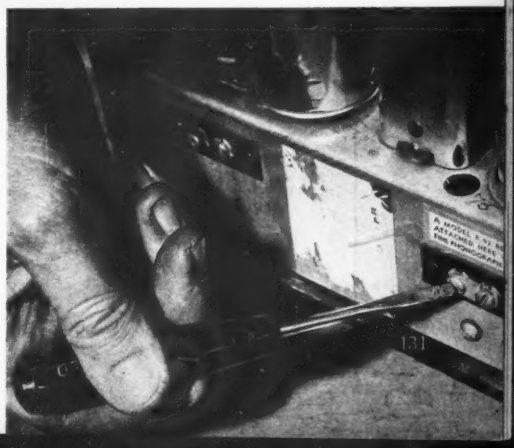





A SMALL NEON GLOW LAMP will make an attractive panel light for your radio set. Drill the panel to accept the prongs of a plug-in socket and apply a bit of cement between the socket base and the panel. Bring out flexible leads to the set side of the on-off switch and to the opposite side of the power line. Use a one watt lamp. ➔

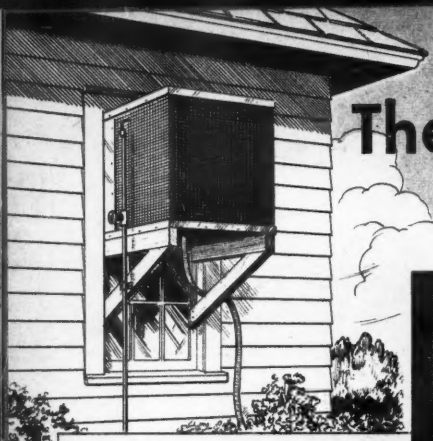
FLASHLIGHT TIP. If you want to get the maximum light output out of your flashlight you should clean the reflector and lens every now and then. You can find an efficient cleaner to do this right on your bathroom shelf. If you haven't guessed it by this time—look left. Yep, ordinary toothpaste. Apply the paste with a wad of wet absorbent cotton and polish till dry. Don't forget to polish the trim. ➔

THAT MYSTERIOUS STATIC-LIKE NOISE you may sometimes hear in your radio, especially during loud passages, may be due to nothing more serious than loose binding posts. Check those binding posts which are not in use, such as the extra post for a doublet aerial and the posts set aside for converting the radio into a phonograph combination. All the set-screws on these posts should be screwed down tight. Check the leads going to tops of the tubes as well. ➔



# The MI Home Cooler

BY MI SIBLEY



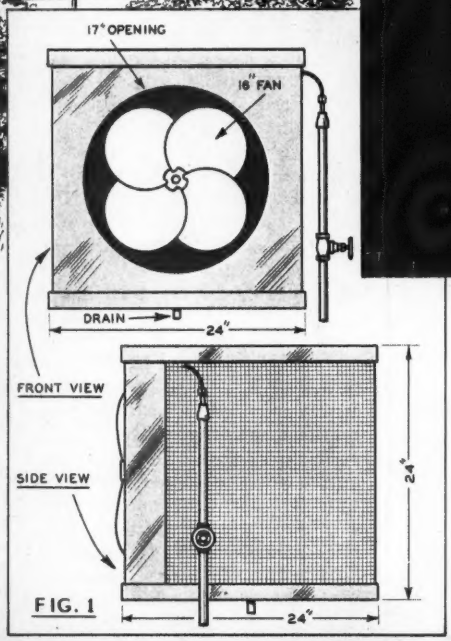
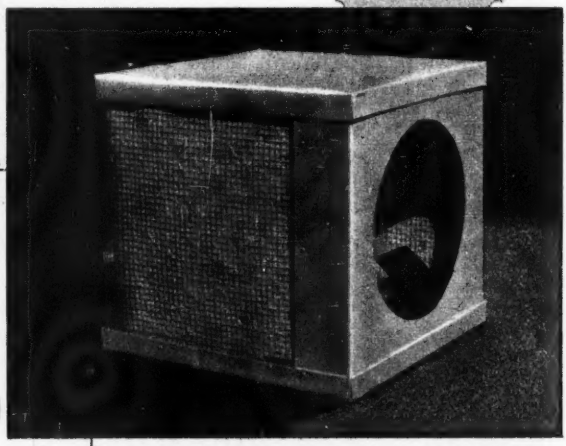



FIG. 1

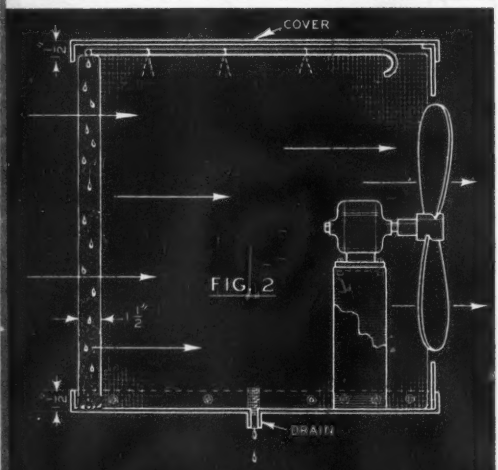


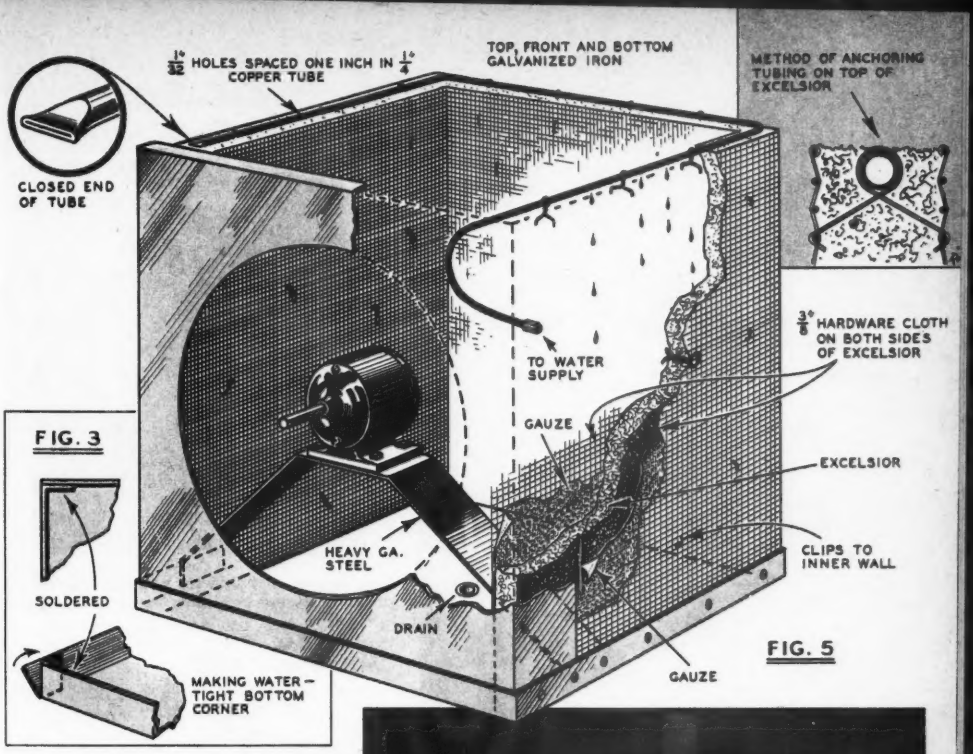
**The cooler is made of galvanized iron with double walls of hardware cloth packed with excelsior.**

COOLING water or foods by heat absorption through evaporation is about the simplest method of reducing temperatures. You are aware of it when a breeze dries up perspiration on the body; the Army uses the same principle in its modified "lister" bag to cool and disinfect water. House coolers designed on this principle have long been used in the Southwest.

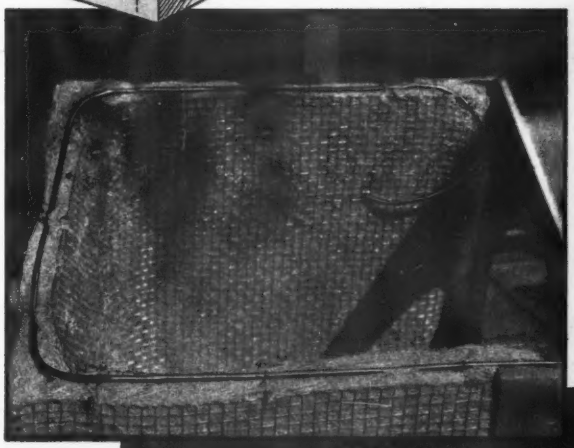
A simple but effective adaptation is illustrated here. Briefly, an electric fan draws air through walls of loosely packed moist excelsior and forces the air into the house. The most efficient location is at ceiling height; the cool air descends, forcing the warmer air upwards where an ample vent should be provided at the opposite end of the building. Removing the upper sash of a window and placing the cooling unit against the opening is a satisfactory arrangement for flat ceilings. If the room extends to the rafters, a gable location should be used.

Fig. 1 shows the appearance and overall dimensions of the writer's home cooler. The front wall has a circular opening with a half-inch clearance for the fan





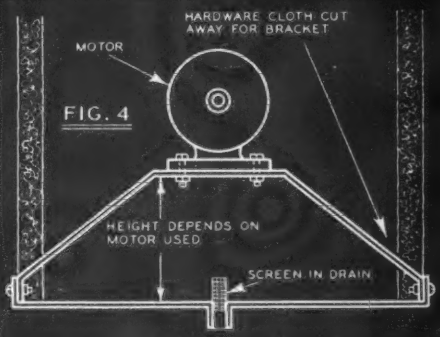

**Small holes in the copper tube supply water to keep excelsior moist.**

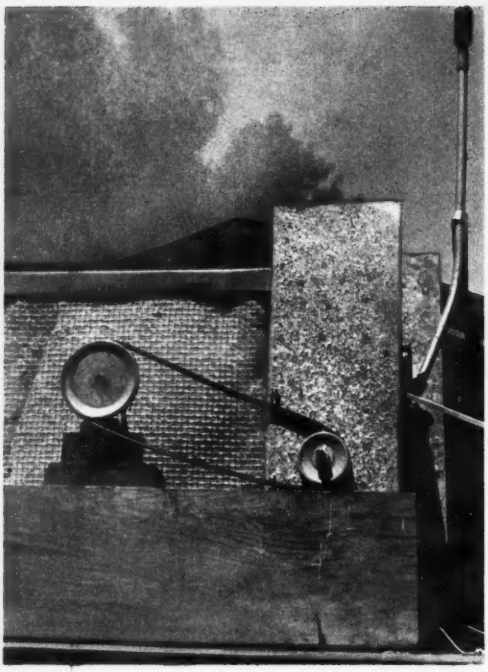


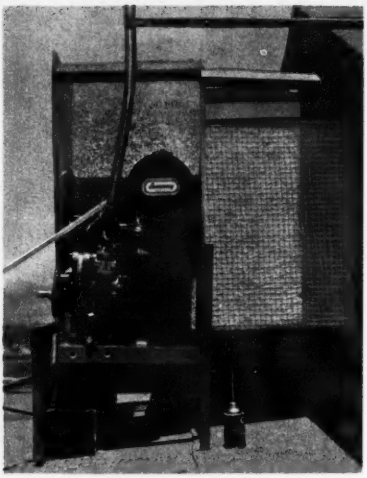
blades, the top is simply a removable lid and the bottom a flat, water-tight pan with a drain in the center. The sectional view, Fig. 2, illustrates the action. Air passes through the loosely packed excelsior between the double walls of hardware cloth. The excelsior is kept moist by water dripping from a perforated copper tube. See photograph.

The water-tight corners of the bottom pan are shown in Fig. 3, and it is upon this pan that the entire structure is erected. A heavy steel sheet, about 1/32 in. thick, is used for the motor bracket which is bolted to the sides of the pan, Fig. 4. This construction permits an unimpeded flow of air. The bracket is installed after the outer wall of hardware cloth has been bolted to the pan. Use lock washers throughout.

Next step is to make a pad of excelsior. The pad should be 24 in. wide and 72







**Gas engine installation. Housing (above) prevents engine heat from entering cooler.**

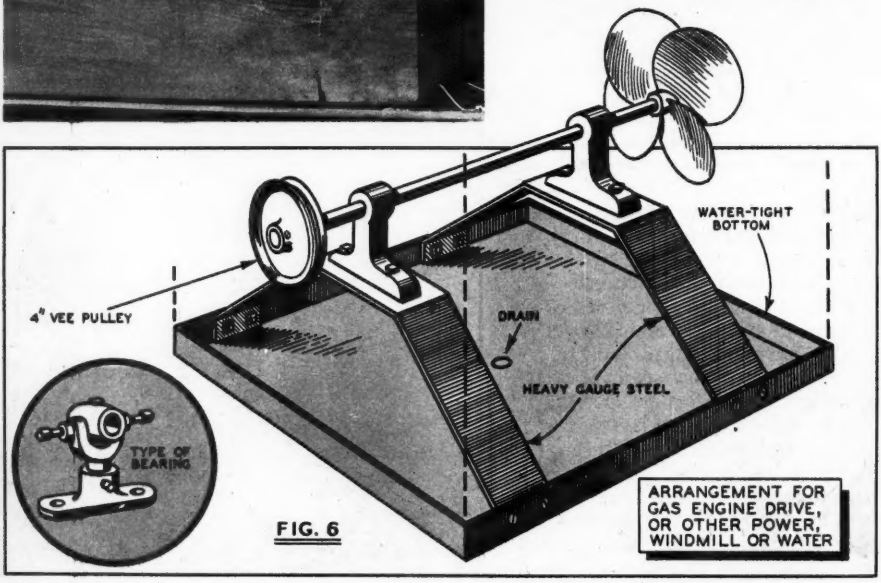



FIG. 6

in. long. This is fitted against the hardware cloth in a square U-shape, cut away to straddle the motor bracket. Next install the inner wall of hardware cloth and secure it with copper wires through the excelsior to the outer wall, Fig. 5.

You will need about 7 ft. of ¼ in. copper tubing, perforated every inch or so 1/32 in. on the underside. The tube should be anchored on top of the excelsior, midway between the walls, with copper wire clips as illustrated. A valve should be provided for water control, and the tube should be tested to make sure each tiny stream runs down upon the excelsior and does not squirt to one side. Before starting the fan, turn on the water to give the [*Continued on page* 148]

# MONTHLY PHOTO CONTEST

**1st PRIZE**
*This One's On Me*

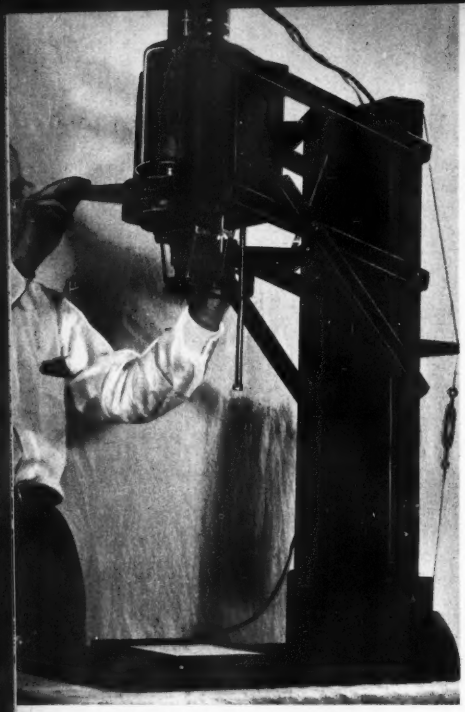
**3rd PRIZE**
*Two Heads Are Better Than One*

**FIRST PRIZE ($10) "This One's On Me," sunlight-photoflash shot taken by Wesley Reid, Minneapolis. SECOND PRIZE ($5) "Evening," a beautiful photo by Rudy Boger of New York City, Super-Ikonta B, yellow filter. THIRD PRIZE ($4) "Two Heads Are Better Than One," an interesting study of Mary Jane by her father, John Makar, Detroit. FOURTH PRIZE ($3) "Time to Relax," by I. Heffner, Albany.**

**2nd PRIZE**
*Evening*

**4th PRIZE**
*Time To Relax*

Submit contest prints unmounted—no larger than 8x10 inches. With each print list camera, film, lens opening and shutter speed, illumination, and developer. Write your NAME and ADDRESS on the back of each print and wrap securely with cardboard or corrugated stiffeners. ENCLOSE POSTAGE for the return of unused prints. Published prints cannot be returned. Judges are MI editors. In case of a tie, duplicate prizes will be awarded. Address: Photography Editor, MECHANIX ILLUSTRATED, 52 Wall Street, New York 5, New York.



# Parallel Arm Enlarger

ARTHUR H. SMITH

**Whether you use a 35mm camera or a 4x5 Speed Graphic, this enlarger will take both and intermediate negatives.**

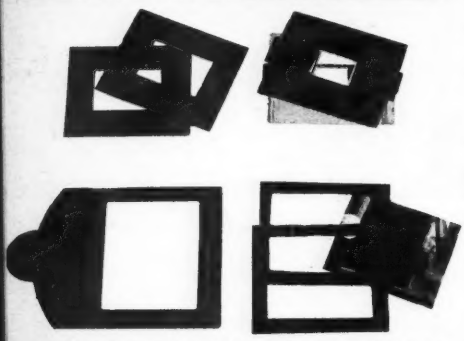
GET out the old snap-shot album and look it over. There are literally hundreds of new pictures within those old ones. Having discovered these pictures within pictures, how are we to get them out? What we need is an enlarger that can project just a portion of the negative.

The enlarger described and illustrated is extremely steady and the magnification range can be readily adjusted. It was designed primarily to take a 4x5 camera. This camera, having a demountable lens, is the one most frequently used, since a lens of shorter focal length can be attached when a small negative area is to be enlarged.

The chart, Fig. 1, should be helpful in deciding whether you wish to make any changes in dimensions based on the camera you intend to use. For example, if you use a 35mm camera, and never expect to make enlargements over 8x10, the enlarging head needs only a range of 6 to 18 in. If a camera taking 2¼x3¼ film is used a range up to 28 in. will yield a picture of about 16x23 in. It should be remembered however, that you may wish to enlarge only a small portion of the negative, so that using, for example, a 3½ in. lens and enlarging only half the 120 negative it would require 7x magnification (28 in. from lens to paper) for an 8x10 enlargement.

It will be noted from the chart that there are definite relationships between A (distance of the lens from paper), B (distance of the lens from negative) and C (dimensions of the resulting enlargement). As A is increased, B must decrease to bring the projected image into focus.

A good place to start with is the base-board and upright assembly, Fig. 3. The base-board is a standard 18x24 in. drawing board. The diagonal bracing between the



**Negative carrier with masks for various size negatives. Masks fit into rabbet of carrier.**

**Lamp-house assembly. Socket can be raised and lowered on rod to get even illumination.**

An Argus camera locked to the adapter. 35mm negatives need not be cut for projection.

Here the enlarger is shown hooked up with a 2¼x3¼ camera in the adapter.

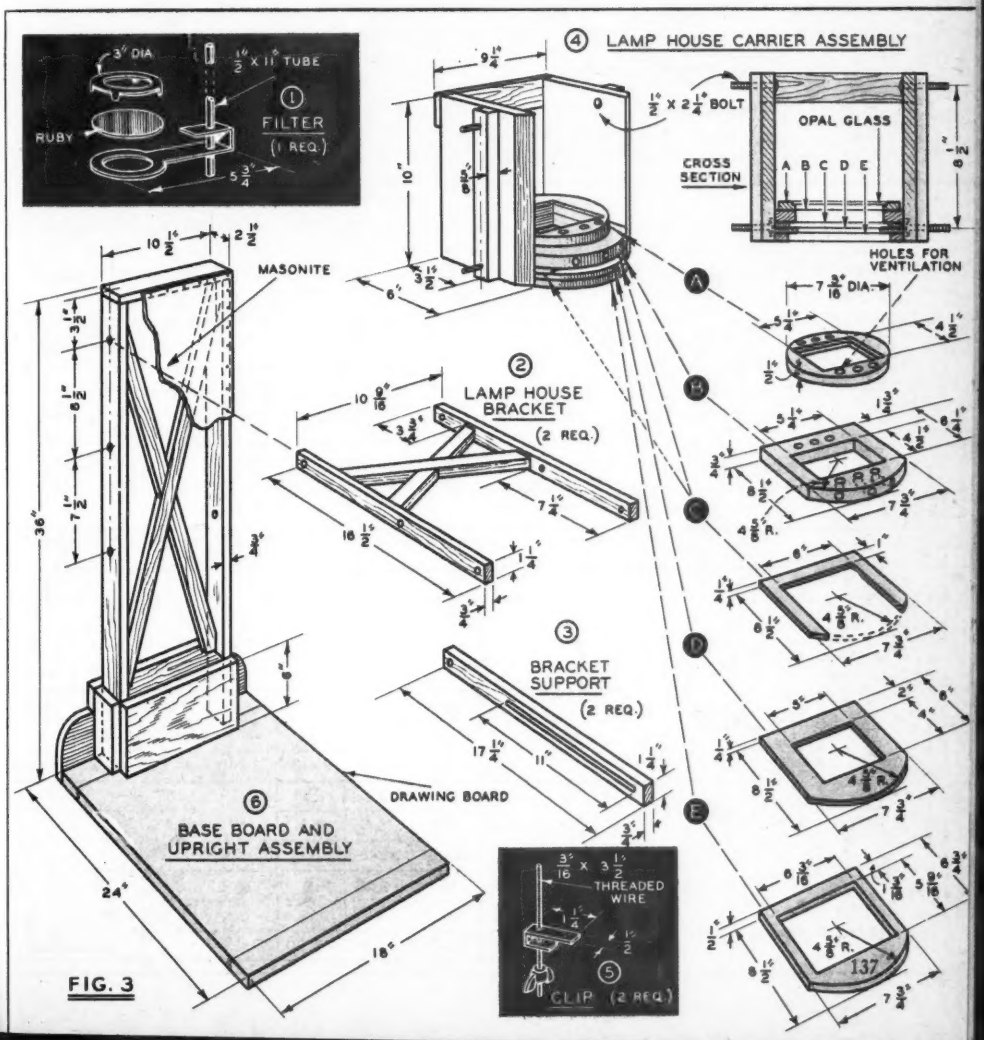



FIG. 3

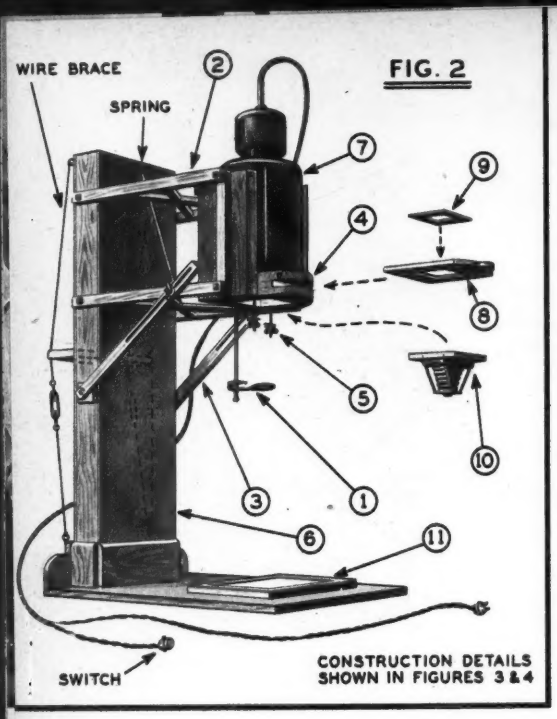



FIG. 2

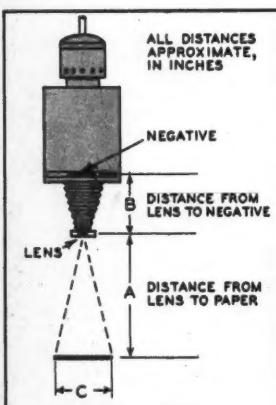
vertical members is important as it eliminates side sway. In the photo, on top of page 136, you will note that guy-wires with turn-buckles have been used at the back to increase rigidity. The masonite sheath was added purely for appearance's sake.

The lamp-house brackets, Fig. 3, which will be bolted to the uprights and to the lamp-house carrier, use the parallel arm principle. Their function is not only to provide an easy means of adjusting the distance of the enlarger head from the base-board, but to keep the enlarger head perpendicular to the paper.

To counterbalance the enlarger a screen-door spring should be attached from the intersection of the diagonal braces of the lower brackets to the center of the upright as shown in the drawing at the left.

The bracket supports, Fig. 3, lock the enlarger firmly at any desired height. They are bolted to the uprights, one at each side, and a bolt with a washer and wing-nut lock them to the lower lamp-house brackets.

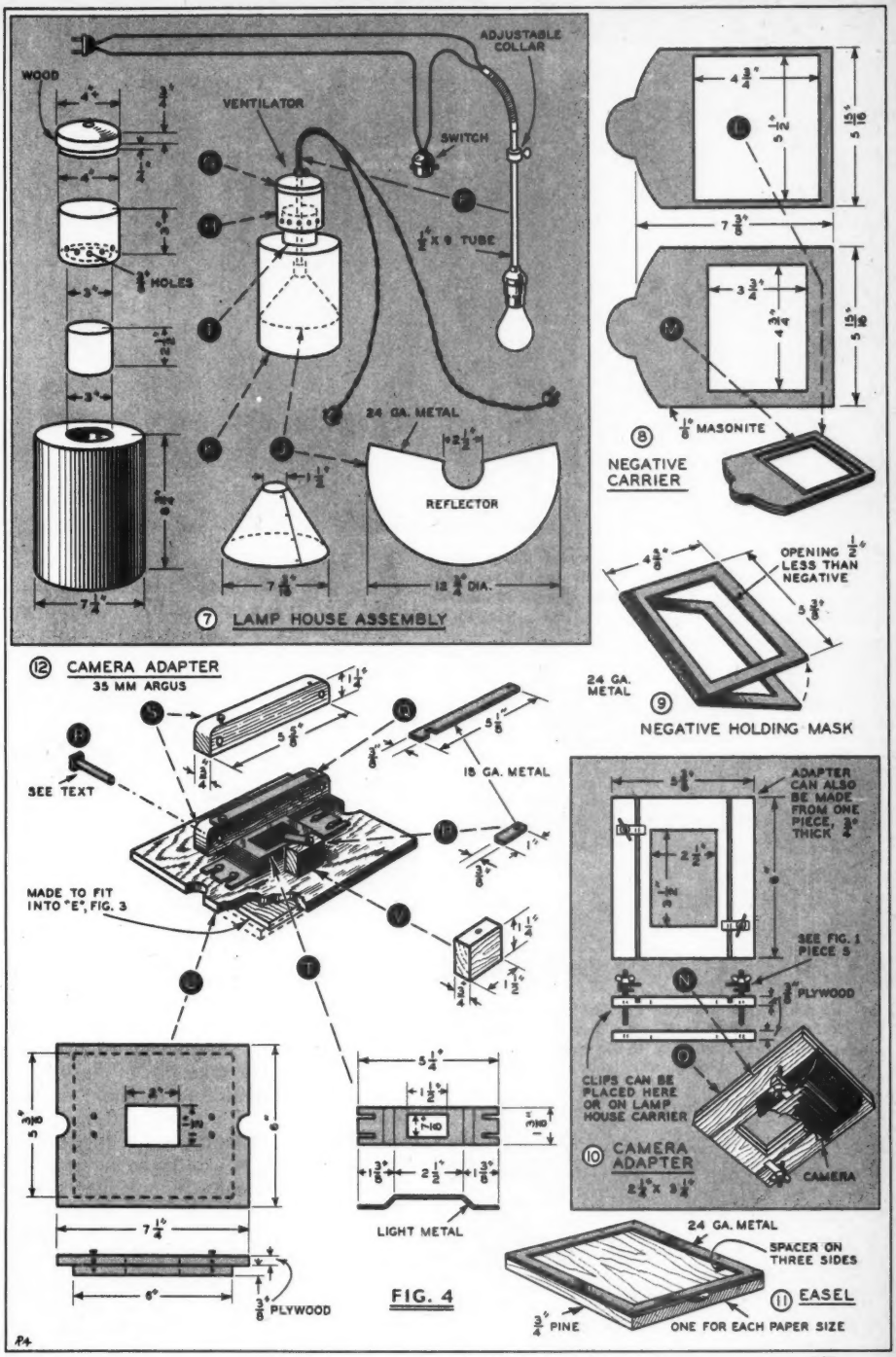
The lamp-house carrier assembly, while consisting of several components, is not difficult to make. Detail A is simply a circular piece of 1/2 in. wood to fit the inside of the lamp-house. The rectangular opening is rabbetted to take an opal glass. Detail B is made from 3/4 or 1 in. stock. It forms the base upon which the lamp-house rests, and in it are drilled holes to provide ventilation. In drilling the ventilating holes, A should be mounted on B. Drill the top holes through A, continuing about halfway through B. Then drill the front and back holes horizontally in B to meet the top holes. Detail C, made of 1/4 in. stock, forms the channel, when mounted on D for the negative carrier. Detail E, cut from 1/2 or 3/4 in. stock, forms a light tight bed or rabbet for the camera, or adapter on [*Continued on page* 150]




DIMENSIONS OF ENLARGEMENTS

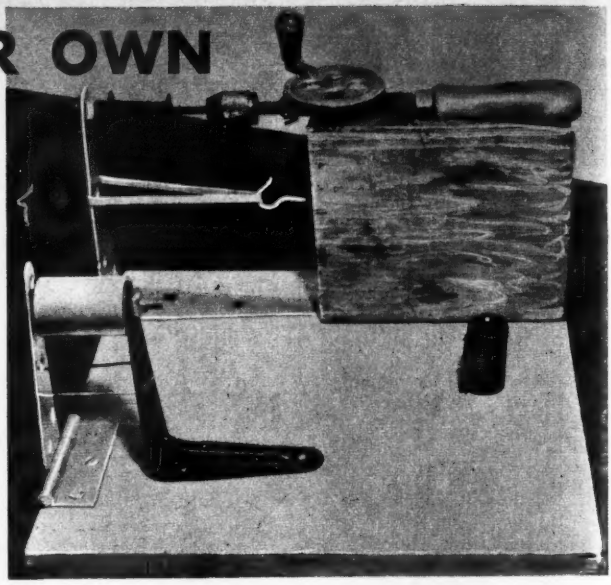
| LENS | NEGATIVE | | MAGNIFICATION | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2 x | 3 x | 4 x | 5 x | 6 x | 7 x | 8 x |
| 2" | 35 MM | A | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| | | B | 3 | 2.7 | 2.5 | 2.4 | 2.3 | 2.27 | 2.25 |
| | | C | 2 x 3 1/2 | 3 x 4 1/2 | 4 x 6 | 5 x 7 | 6 x 9 | 7 x 10 | 8 x 12 |
| 3 1/2" | 2 1/4 x 3 1/4 | A | 10.5 | 14 | 17.5 | 21 | 24.5 | 28 | 31.5 |
| | | B | 5.25 | 4.6 | 4.3 | 4.2 | 4. | 4. | 4. |
| | | C | 5 x 7 | 6 x 9 | 9 x 12 | 11 x 16 | 14 x 20 | 16 x 23 | 18 x 26 |
| 5" | 3 1/4 x 4 1/4 | A | 15 | 20 | 25 | 30 | 35 | | |
| | | B | 7.5 | 6.6 | 6.3 | 6 | 5.8 | | |
| | | C | 6 x 9 | 9 x 12 | 13 x 17 | 16 x 20 | 20 x 26 | | |
| 6" | 4 x 5 | A | 18 | 24 | 30 | 36 | | | |
| | | B | 9 | 8 | 7.5 | 7.2 | | | |
| | | C | 8 x 10 | 12 x 15 | 16 x 20 | 20 x 25 | | | |

FIG. 1

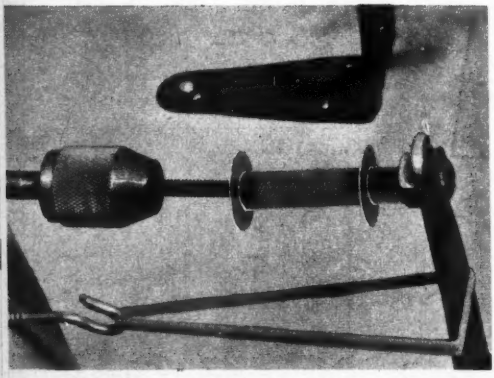

WOOD
VENTILATOR
ADJUSTABLE COLLAR
SWITCH
1/2" X 9 TUBE
3/8" HOLES
24 GA. METAL
REFLECTOR
7 LAMP HOUSE ASSEMBLY
8 NEGATIVE CARRIER
1/8" MASONITE
9 NEGATIVE HOLDING MASK
OPENING 1/2" LESS THAN NEGATIVE
24 GA. METAL
12 CAMERA ADAPTER
35 MM ARGUS
SEE TEXT
18 GA. METAL
MADE TO FIT INTO "E", FIG. 3
ADAPTER CAN ALSO BE MADE FROM ONE PIECE, 3/4" THICK
SEE FIG. 1 PIECE 5
3/8" PLYWOOD
CLIPS CAN BE PLACED HERE OR ON LAMP HOUSE CARRIER
10 CAMERA ADAPTER
2 1/2" X 3 1/2"
CAMERA
LIGHT METAL
3/8" PLYWOOD
FIG. 4
24 GA. METAL
SPACER ON THREE SIDES
11 EASEL
3/4" PINE
ONE FOR EACH PAPER SIZE

# ROLL YOUR OWN

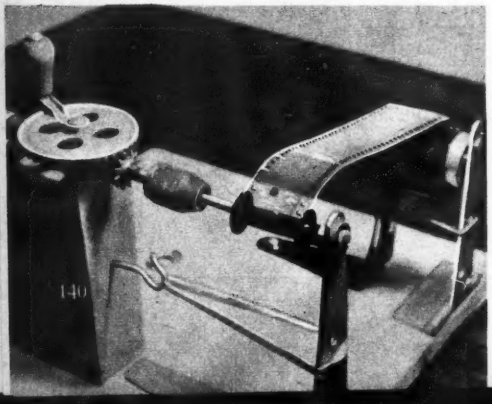
**Film for your 35mm camera will cost you 36 cents per roll if you reload yourself.**



**You will avoid the predicament of this fan if you use the winder illustrated above.**



**Phantom view showing how the cross-piece of the spool engages the slot in the bolt-head. Below: The film has been fastened to the spool with a bit of scotch tape and is now ready to be wound.**



AN ECONOMY possible to the user of 35mm film is the purchase of bulk film. But, it is a tedious job to hand-load the cartridges, and finger marks and dust often result from the operation. For about 50 cents, a simple winder, which will load your cartridges quickly and cleanly, can be made in a few minutes.

As may be seen from the illustrations, it is merely an inexpensive hand drill holding a bolt in place of a bit. The slot in the bolt head fits into the core of the cartridge spool, and a few turns of the handle winds the film onto the spool. The open end of the spool is supported by another bolt set in the end of a strap hinge which is held against the spool by the tension of a rubber band. An empty cartridge can or a common thread spool mounted on a little bracket, supports the roll of bulk film. Another strap hinge is held against the side of the roll of film by a rubber band to keep it in place.

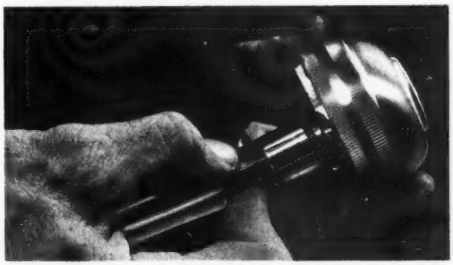
The drill handle is fastened to the block of wood with a piece of strap iron and a screw through the handle. Carve the top of the block to fit the curve of the handle. Be sure that the bolt held by the drill handle is level with the bolt in the end of the strap hinge against which the cartridge spool will rotate.

Of course, the winder must be used in the dark, but it is so easy to use that a dozen rolls may [*Continued on page* 152]

# For the PHOTO FAN

LABLES ON STOCK SOLUTION BOTTLES will last longer if they are varnished. Labels should also be applied (and varnished) to the tops of containers to avoid contamination. Colored labels help tell developers from fixers under the darkroom light.

A SIMPLE WAY TO RECORD TEST EXPOSURES with a filmpack is to write the data about each picture on the tab after it is pulled out. Use a white or silver pencil obtainable at any stationer's. The tabs may be pasted into a book to serve as a guide for future work.



REPAIRING TRIPOD LEGS. After use the legs in tubular tripods loosen at the head. They can be tightened with a strip of .0015 in. stock wrapped around the leg and forced into the head. Heating the head and chilling the leg in a refrigerator will give you a really tight fit.

ADHESIVE SPREADER. The brush on a typewriter eraser is excellent for applying paste or glue to the backs of prints when mounting them in album pages.

### THE QUESTION BOX

*by Robert Brightman*

Photo fans! Use this column for answers to any of your problems on photography. If the question involves a print fault please include the print with your letter (and postage for its return).

*Can I use Kodacolor film indoors? T. S.*

At present Kodaccior film is made for outdoor use only. If you must use it indoors take the pictures with the blue Photoflash Lamps Nos. 21B or 5B. Do not use regular photoflash lamps, flood lamps, or even the blue photofloods as the results will be unsatisfactory—the prints will have an orange cast.

*Is there any way I can rejuvenate faded photographs? T. K. L.*

Sepia toning will often restore such photographs.

*When I put my prints in the short stop bath I can see a lot of bubbles rising to the surface and sometimes I can even hear a sort of squeaking sound. What causes this? P. O.*

Your short stop bath is too strong.

*Can you tell me why I can't get a good glaze on the enclosed print? M. A.*

Insufficient hardener in the fixing bath, wash water too warm, or a dirty ferrotype tin will cause the speckled appearance your print shows.

*What is meant by printing-out paper? K. L. P.*

This is a proof paper (called POP) on which the image can be seen immediately after exposure (printing) and without the need for a developer. The image is dark red and tends to fade with exposure to light. The paper is very slow and can only be exposed by means of sunlight or very strong artificial light.

BY FREDERICK RUSSELL

SPRINGTIME SERVICING includes going over all the manifold nuts with a tension wrench. Unless this is done occasionally chances of manifold gasket leaks are greatly increased. Check for evidences of exhaust manifold leakage and look for a crack on the under side of the intake manifold. (Photo No. 1)

HEAVY VIBRATION at certain car speeds may be due to wear on the universal joints. Such wear, or looseness, permits the propeller shaft to whip. Pending replacement of worn joints, some improvement can be obtained by using heavier lube of a more soap-like consistency. (Photo No. 2)

THAT ANTI-SWAY BAR between the shock absorbers at the rear and sometimes at the front end, will become noisy in operation if the rubber bushings become dry. The bushings should be lubricated occasionally with fresh brake fluid or with special rubber lube. Never use oil for this job. (Photo No. 3)

2

BADLY SLUDGED MOTORS should always be cleaned out manually, not with chemicals. Final cleaning, however, can be done with sludge removers. If such solvents are used for a very dirty engine, some of the sediment will be carried into the drilled oil passages in the connecting rods. The piston pin illustrated was scorched when it failed to get enough oil. (Photo No. 4)

BATTERY FAILURE can be due to so many conditions it isn't surprising that the generator cutout, as a separate unit or combined with the voltage regulator, is so often overlooked. Sticky generator points

1

3

4

5

will not only allow the battery to discharge back into the generator but will likely damage the latter.

HINT OF ALIGNMENT TROUBLE is uneven tire wear. You can detect this by rubbing your hand over the surface and noting evidences of wear. Even a "feather edge" wear is a warning. (Photo No. 6)

EXCESSIVE CURRENT CONSUMPTION was a mystery to H. B. McW. until he discovered the stoplight bulbs were in the tail light sockets and vice versa. Thus, at night the lights drained the battery at a much higher rate. (Photo No. 7)

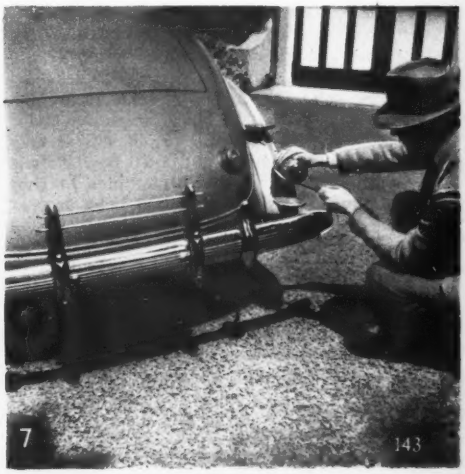
DOUBLE CYLINDER HEAD GASKETS were all right when gas was of low anti-knock rating and when this was used as a means of reducing compression, but to take advantage of high octane gas it is necessary to raise compression through more efficient rings and valves. A single gasket is, therefore, a "must."

### TRY IT!

When the engine starts misbehaving there's a good chance some oil has found its way to the distributor breaker points. On this assumption, remove the distributor cap and carefully separate the points. Now rub them together as best you can and wipe with a piece of clean cloth. Do not file the points unless you are prepared to adjust the gap. Since the primary current passes through these points any reduction will be reflected in greatly decreased high tension current to the spark plugs.

**Your car needs careful attention to give long and faithful service. If you have a problem with your car, ask Mr. Russell. Just send stamped, self-addressed envelope to him at MECHANIX ILLUSTRATED, 52 Wall St. N. Y. 5, N. Y.**

6



7

[*Continued from page* 129]

the wood will rot first around the fastenings.

The only cure for dry rot is to tear out every bit of infected wood and replace. If you leave a few shreds of dry-rotted wood, the disease will spread to the new wood in a short time. Paint will help prevent it, if the entire surface is painted before the wood is put in place. There are wood preservatives on the market which will do a lot to keep dry rot at bay, but here again, the entire piece of wood should be dipped or soaked after it is cut to shape and ready to put in place. On old sailing ships, rock salt was used copiously all over the inside of the ship, the idea being to thoroughly salt the wood, thus preventing a great deal of dry rot. At regular intervals, ships were "salted" and in time this treatment made the wood almost as hard as iron. There is no reason why it could not be used today on many boats.

If you buy one of these older boats, you will naturally want to make it as seaworthy as possible. If some of the planking is bad, tear it out and replace. Perhaps, after you rip out the planking, you may find that the frame is too soft to hold the new fastenings. If such is the case and in order to hold the shape of the boat as closely as possible, bend in a new oak frame alongside the other, painting between them first. Fasten the new frame through the old frame where the wood is sound enough. If the old frame is too far gone, fasten your new planking to the new frame and then tear out the old frame altogether. If a frame is cracked or broken, bend a new frame alongside it and then fasten your planking, pulling the edges of the planks back in place with heavy brass screws or even small bolts.

Canvas decks will also go in a few years, mostly because paint that is too thick has been applied. It is far better to use several coats of thin paint rather than one coat of heavy paint. An enamel deck looks fine for a time, but it will surely start to crack or craze in a short time and once this is started there is no way to stop it. Sanding down and putting on another coat is a temporary cure, but in time the cracks will reappear. Even if the canvas is scraped down, using paint remover, the cracks will still come back in time because the very cloth itself has pulled its fibers at each crack and the new paint will be but a temporary affair.

The only way to do a real job of it is to take off all the old canvas and put down new. This is quite a job as it means that all moldings, hatches and sometimes even deck houses must be removed. At least they should be if the job is to be done right. Figures 1 and 2 of the drawings show how and why the canvas should be run inside. In Fig. 1, the canvas is brought to the edge of the house and turned up, tacked in place and covered with a molding. In a short time, working of the boat, hot sun or dampness will cause water to seep through between the house and the inside edge of the canvas. This is shown at point marked X. If you try to caulk this seam, it will only serve to push the molding away and open up the crack more than ever. Thick paint, seam composition or anything else you may apply, will only be a temporary measure.

In Fig. 2 the canvas has been carried through, under the edge of the house and turned up inside where it is tacked at the point marked Z. This is covered by the coaming piece inside and can never leak if the job is done properly. At the corners of the house, a double thickness of canvas is used to prevent any opening. The small molding on the outside should have its inner corner rounded off so it won't cut the canvas.

On some boats where this cannot be done because of structural difficulties, a gutter made of sheet copper is run fore and aft under the troublesome joint. The low part of this gutter may have a piece of copper gas tube soldered to it. With the other end passing through the hull, the excess rain water may be carried off. Skylights, frequently have this sort of arrangement under the hinged joint and it seems to work quite well.

Planking seams are, of course, the source of most leaks and, on an old boat, it may take a lot of repairing to get them right. The old caulking should be scraped out, particularly if it shows black, which is a sure sign that it is about through. The seam should be scraped clean and new caulking driven in. On small boats, having thin planking, no caulking at all should be used or at best, just a strand of cotton caulking material, rolled in place. The roller is made by grinding down a large washer to a not-too-sharp edge and attaching a handle, as shown in Fig. 3. The secret of caulking is not to get too much of it in the opening. Just a little will do and will also leave room for finishing off the seam with a seam compound or a mixture of white lead and putty. The seam should be painted before the caulking goes in and should be caulked while the paint is still wet. The seam should be finished off slightly hollow so the planking, when it swells, will push the composition out just enough to make it flush. This is particularly important on the bottom of the boat. If you put in too much caulking and too much composition, it may swell to the point where each seam will be a distinct ridge, not only spoiling the looks but also causing considerable resistance which may slow the boat considerably. To really do the job right, the boat should be again hauled out after it has been in the water for about ten days and the seams cleaned off and smoothed up for another coat of paint.

In many instances the hull may have a few holes, in which case the area should be carefully examined to see how much secondary damage has been done. By this we mean loosened fastenings, cracked or broken ribs etc. Loosened fastenings will have to be replaced and broken or cracked ribs strengthened by bending another rib alongside those injured. Repairing holes is shown in Fig. 4.

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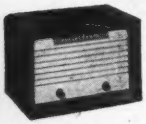

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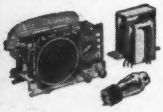

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## Tilt-Top Hamper

[*Continued from page* 97]

imperfections will show up after the finish is applied to the wastebasket.

A color-chart, available in any art store, will enable you to select a contrasting color for a room in which the color scheme is of a predominating hue. For example in the case of a "blue-room," vermillion should be used. Three coats of quick drying enamel will produce an excellent finish. Each coat, after drying, should be sand-papered.

The decorations shown are hand painted, but decalcomanias are available which are easily applied. Designs can also be copied from a magazine on a sheet of paper and transferred by means of carbon paper. The painting of the decorations, especially the outlines, is best done with a fine, round, pointed artist's brush. Oil paints, procurable in any color in small tubes at any art store, or enamel can be used. The outlines of the ship, birds, and anchor, in the hamper illustrated, as well as the "waves" are "marine-blue." The sails, boat, birds, and anchor are white.

The design of the hamper is sufficiently conventional so that it will not "fight" with furniture of any design; it is novel, a little different than the sort of wastebasket found in the shops, and it lends itself to an infinite variety of decorative motifs. It is just the sort of accessory to "pick-up" a tired room.—*A. H. Smith.*

## Low Cost Greenhouse

[*Continued from page* 121]

sash are stuccoed over metal lathe and building paper.

Stock-size lights, or panes, are lapped one inch on the roof, secured with glazier's points and puttied over against the wood strips, as shown in Fig. 5. Galvanized strips at the eaves are bent over to prevent loosened panes from slipping down. On the sidewalls the panes are butted. In filling the deep flower boxes, after ¾ in. holes have been bored in the bottom and covered with copper screening, make a layer of sand upon which the heating cable is laid as shown in Fig. 6. The thermostats are set in galvanized cans with lids and should be regulated to shut off at about 70° F. The wiring diagram explains the connections.

Roof ventilating sashes are three light units with the glass flush with the lower cross-member, Fig. 7. Operating mechanism is illustrated in Fig. 8 and is extremely simple. When the handle is pulled down the ratchet engages a guide on a tie-beam. Locations of the pins and lengths of the links are given in the squared drawing.

---

Printing cloth with light-rays is a future possibility; the pattern to be printed would be photographed on a motion picture film and this film projected onto a cloth made light-sensitive by chemical treatment.

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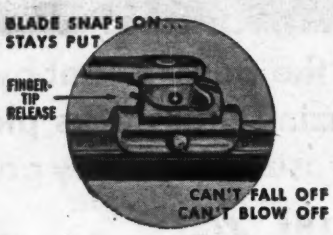


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## Hobby Knife Set

[*Continued from page* 122]

between centers, beginning at the small end. It is reversed in the centers to finish the head, cut off and faced. The small end is threaded with a die, and then the blade slot is cut. Use a fine saw, so the slot will not be much wider than the blades. Keep the cut straight and sand it smooth.

The lock is knurled and shaped between centers, cut to length and also faced in the scroll chuck. It is then drilled and tapped carefully so that it will turn smoothly on the end of the blade clamp.

If the slot in the blade clamp cannot be closed by turning the lock, cut a groove at the point indicated in the diagram.

### THE BLADES

A plentiful supply of razor-sharp blades can be made from discarded hacksaw blades. Blade shapes and sizes are a matter of choice. The gripped ends of the blades must, of course, be of the correct dimensions to fit in the handle.

The steel used in hacksaw blades varies considerably; many blades are tempered only on the cutting edges. The best solution is to grind all the blades roughly to shape and then harden them by heating bright red and quenching in oil. After this they can be carefully finished, ground and polished.—*Will Thomas.*

## The MI Home Cooler

[*Continued from page* 134]

excelsior a thorough drenching. Waste water can be piped to irrigate nearby plants.

If electric power is not available a ½ h.p. gasoline engine will have to do. It should be mounted independently of the structure supporting the cooling unit to eliminate vibration. The best method is to set a sturdy post in the ground near the cooler and transmit the power with a belt. Arrangement of fan shaft and bearings is illustrated in Fig. 6. Bearings and pulleys are standard items and can be purchased from a mail-order house.

This type of cooler is, of course, more efficient in a hot dry climate, but will also give a welcome degree of comfort in more humid sections. It will supply a continuous flow of dust-free air. The excelsior should be renewed when it becomes too dust-clogged. In the particular installation in which this unit was installed it always kept the house at least 10 to 12° cooler than the outside.

[*Answers to page* 117]

**1. Pedicure. 2. Fingernail nipper. 3. Manicure. 4. Household and industrial shears. 5. Hair cutting. 6. Sewing. 7. Metal-cutting snip (compound). 8. Grass shears. 9. Pruning. 10. Metal cutting snip (regular). 11. Hedge shears. 12. Pinking scissors.**

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## Parallel Arm Enlarger

[*Continued from page* 138]

which the camera will be mounted. Details A, B, C, D, and E are glued and nailed into one unit as shown in the cross section view. The sides are made of ¾ in. wood, and are bevelled at the front. Before attaching the sides insert the bolts for the lower lamp-house brackets, countersinking the heads. The ⅝ in. vertical members on the sides of the carrier are spacers to make the overall width of the lamp-house carrier the same as the upright.

When the various components have been assembled as shown in the drawing, Fig. 2, we have only to add clips for holding the camera in place, and a light filter to complete the enlarger proper. The filter is necessary as a means of intercepting the white light from the enlarging lamp while the projection paper is being positioned. Such a filter device is shown in Fig. 3 (part 1). It is a circular frame, cut from light metal, to hold a ruby filter of glass or celluloid.

The lamp-house assembly is shown in Fig. 4. The main housing, K, is a 6½ quart metal container. This size amply covers a 4x5 area. As indicated in the drawing, a 3 in. hole is cut in the bottom of K to form an opening for I. The bottom of the container, becomes the top of the lamp-house. Detail I is a tin can with the bottom cut out to form a cylinder, and is soldered to K as shown. The ventilating unit, H, is also a tin can, larger in diameter than I, and cut to a height of 3 in. A 3 in. circular hole is cut in the bottom through which I is inserted to a depth of 2 in. and soldered all around. A series of ⅜ in. holes are drilled ½ in. from the bottom. Insert I so that it extends above the holes.

The top of the lamp-house assembly supports the enlarging lamp. A 9/16 in. hole is drilled in the center to take the enlarging lamp supporting unit. The long tube is necessary, not only to reach through the ventilating unit, but for adjusting the position of the enlarging lamp, which may have to be raised or lowered so that the light will cover the opal glass evenly.

The reflector may be cut from tin. The finished bottom diameter should be slightly less than the inside diameter of the lamp-house, and the top finished diameter a tight fit on the light socket. The outside of the reflector should be painted flat black and the inside white. See photo at the bottom of page 136. A 75 watt enlarging lamp furnishes illumination.

The glassless negative carrier, Fig. 4, part 8, can be made of ⅛ in. masonite, cutting two frames as shown and cementing them together.

The negative holding mask (part 9) will, if made of fairly heavy metal, hold the negative flat; the masks may be hinged with tape if desired.

All that remains now is to fit the camera to the enlarger. Since it is impossible to know just what camera may be used, a couple of suggested adapters are shown in Fig. 4, parts 10 and 12.

[*Continued on page* 152]

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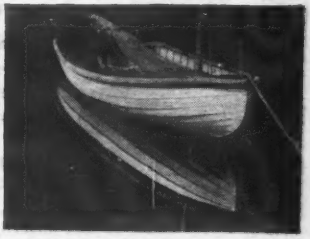

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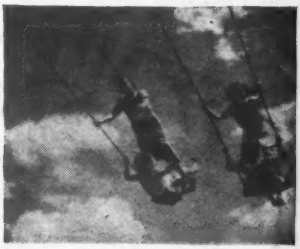

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## Parallel Arm Enlarger

[*Continued from page* 150]

The adapter (part 10), though actually made of two pieces, could have been made out of a single piece of ¾ in. stock. It fits into the bed of the lamp-house carrier and is held in position with the clips as shown in the photo at top of page 137.

The 35mm camera poses a problem; it is necessary to provide a means for bringing the negative into the same plane as the film occupied when the picture was taken. So, the adapter for the 35mm camera is designed to take the entire roll. Part 12 shows the adapter. Detail U is the mounting board made of two pieces of ⅜ in. ply-wood. The piece shown in broken lines fits into the enlarger bed, and the mounting board proper overlaps it. The reason for constructing it in this manner is that the lens of the camera for which it was designed is not centrally located on the camera. Because of the off-center position of the camera lens the long end of the camera body extends beyond the bed of the enlarger.

The back of the camera must, of course, be removed for enlarging purposes. Detail S of the adapter closes the bottom side of the camera, and provides for insertion of spindles, R, into the hub of the film spools. V is a block which fits the space occupied by the light meter which in this camera is removable. Detail Q which is pivoted to S, and P which is pivoted to V, lock the camera onto the adapter as shown in the photo on top of page 137. T provides a light spring tension on the edges of the film to keep it flat.

Now, you're ready for business. A great deal of pleasure will have been experienced in the construction of the enlarger, but there is even greater enjoyment in store through its use, for enlarging is truly a thrilling hobby.

## Roll Your Own

[*Continued from page* 140]

be loaded in 15 minutes. Bits of scotch tape are used to hold the film to the spool. Be sure to wind the film in the proper direction, as shown in the illustrations. If you wish to load less than a full spool (36 shots) you can easily determine how many turns on the handle will give the desired number of pictures to the roll. The spool is put into the cartridge, of course, before the light is turned on, but the leader may be trimmed to shape in the light.

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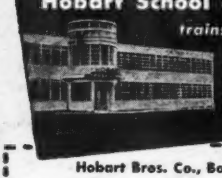

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## Protect Building Materials

[*Continued from page 102*]

rooms have been dried out—with heat if necessary. This precaution prevents open, unsightly joints by avoiding shrinkage after the flooring is laid. It is wise practice not to have finish flooring delivered to the job until you are ready to lay it. Handle bundles of flooring with care, as rough treatment is liable to break the tongue or the groove lips (I) of the pieces, thus spoiling their matching value and causing unnecessary waste of material.

To avoid chipping the edges of a flush slate hearth stone while the edges lie exposed pending laying of the finish floor, cover them with wood strips nailed to the sub-floor (J). Although plaster droppings can be quickly wiped from slate hearth facings, they are difficult to scrape from the rough textured surface and mortar joints of brick and stone facings. Therefore, cover the latter with a drop cloth before applying plaster to the adjacent walls and ceiling. Wooden fireplace mantels should not be installed until plaster and masonry are dry and the finish floor has been laid.

When trying out a new fireplace for the first time, build only a small fire, as rapid drying of "green" masonry is liable to result in cracked brickwork. New plaster must also be allowed to dry slowly. The rooms must be ventilated, however, and the temperature kept above freezing.

Since concrete block should be dry when laid to avoid shrinkage cracks, store them under cover so that they will be ready for use when you need them. Brick, on the other hand, should be damp when laid and therefore need not be covered. To avoid broken corners, stack block and brick in low piles. Store bags of cement and lime in a dry place so dampness will not make the contents lumpy or render it unfit for use. Store wallboard and plyboard indoors and lay the sheets flat on a level surface to avoid warping and broken corners.

To make sure you don't lose screws, washers and other small but essential parts of building hardware, remove them from the small paper envelopes in which they come packed and put them in cloth bags tied to the larger pieces. Tags containing instructions for the installation and operation of building hardware and equipment should be saved and filed for future reference.

## Measuring Tools

[*Continued from page 119*]

very ambitious, and the owner of a jigsaw, cut plywood recesses for your precision tools. This is the best method of protection, but it takes time and not all of us have the patience to do it.

Temperature has a very definite effect on the dimension of steel. That is why plants which make precision tools and instruments very often make them in air conditioned rooms.

# *You Can* Influence Others With Your Thinking!

TRY IT SOME TIME. Concentrate intently upon another person seated in a room with you, without his noticing it. Observe him gradually become restless and finally turn and look in your direction. Simple—yet it is a *positive demonstration* that thought generates a mental energy which can be projected from your mind to the consciousness of another. Do you realize how much of your success and happiness in life depend upon your influencing others? Is it not important to you to have others understand your point of view—to be receptive to your proposals?

## Demonstrable Facts

How many times have you wished there were some way you could impress another favorably—*get across to him or her your ideas?* That thoughts can be transmitted, received, and understood by others is now scientifically demonstrable. The tales of miraculous accomplishments of mind by the ancients are now known to be fact—not fable. The method whereby these things can be *intentionally*, not accidentally, accomplished has been a secret long cherished by the Rosicrucians—one of the schools of ancient wisdom existing throughout the world. To thousands everywhere, for centuries, the Rosicrucians have privately taught this nearly-lost art of the practical use of mind power.

## This *Free* Book Points Out the Way

The Rosicrucians (not a religious organization) invite you to explore the powers of your mind. Their sensible, simple suggestions have caused intelligent men and women to soar to new heights of accomplishment. *They will show* you how to use your natural forces and talents to do things you now think are beyond your ability. *Use the coupon below* and send for a copy of the fascinating sealed *free* book, "The Mastery of Life," which explains how you may receive this unique wisdom and benefit by its application to your daily affairs.

## *The* ROSICRUCIANS
(AMORC)

Scribe D.W.X. The Rosicrucians, AMORC, Rosicrucian Park, San Jose, California.

Kindly send me a free copy of the book, "The Mastery of Life." I am interested in learning how I may receive instructions about the full use of my natural powers.

Name.....

Address.....State.....

# Build Things WORTH WHILE!

The LEJAY MANUAL has a Special Appeal for the Amateur Who Likes to Make Things that Work

FOR ONLY $1.50 WORTH $12.35

SHOWS YOU HOW TO BUILD

**AMAZINGLY SIMPLE PLANS for PRACTICAL PROJECTS**

You will have no trouble in working out the plans detailed in the LeJay Manual and you will get a lot of enjoyment from them. Whether or not you are mechanically inclined, the projects in these plans will appeal to you for their usefulness and practicability. They will save you money and make money for you, too, in jobs and repairs for neighbors and friends, because the plans embody all kinds of electrical devices.

**NO EXPENSIVE TOOLS or MATERIAL NEEDED**

The tools you have around the house are all you need for these projects and most of the necessary material can be found around garages, workshops and scrap yards. Being able to make your own welder helps a lot in doing other jobs, and the LeJay Manual shows you how easy it is to do this. Also, how to make:—

**200 Amp. Generator Welders**
**Large Transformer Welders**
**Gunsmith's Carbon Welder**
**6, 12, 32, 110-Volt Motors**
**Electric Outboard Motor**
**Wind-driven Light Plant**
**Electric Fencers**
**Electric Drills**
**Bench Grinders**
**Electric Scooter**
**Armature Rewinding**
**Insect Electrocutors**
**Electric Bicycle Pusher, etc.**

**SEND NO MONEY—BUT**

Send a postcard with your name and address and a request to send the LeJay Manual C.O.D. and the postman will deliver it at your door. If you are not entirely satisfied after 3 days' perusal, send it back and we will refund the $1.50. Bear in mind, however, that C.O.D. fees have been considerably increased, so if you prefer to save this expense, send $1.50 now, under the same guarantee. In Canada, $1.75.

**LEJAY MFG. CO**
14 LeJay Building
MINNEAPOLIS - 8 - MINN.

3 DAY TRIAL



**PLANS! PLANS! PLANS!**

MI FEATURE MODEL

**DOODLEBUG**

50c postpaid

FULL-SIZED accurate plans of the control-line model appearing on pages 108-113 of this issue. PLAN No. 365

**FLYER**

Speed and utility are featured in this 12-foot plywood outboard. BLUEPRINT No. B-142

Order by number. . . . Send stamps, check or money order to

FAWCETT PUBLICATIONS, INC.
GREENWICH, CONN.


## Little Big-Time Prop

[*Continued from page* 61]

gear at the back of the hub, the prop looks like any fixed-pitch type, since the arms and levers are enclosed in the hub shell. The ring gear—spur or bevel type—is mounted on a bearing which in turn is fastened to a plate. This plate is bolted to the front of the engine, and the rest of the prop hub slips on the shaft as it would in installing any other propeller.

The prop blades are placed in double-row bearings in the hub to keep friction down to a minimum, yet transmit the load from the blade to the hub. One end of each of two levers changes the pitch, acting in a close-fitting slot on one side of the shank of the blade. The slot allows the levers that change the angles of the blades to be mounted off center. This results in a reduction of the effort required to hold the blade at a given angle or to change the angle. The fork pulls or pushes the levers, putting both blades at the same angle and keeping them there.

The secret of the prop is the hub of the ring gear, at the rear of the prop hub. Inside it is an arrangement which, upon the turning of the gear, screws the fork forward or pulls it back.

## Plastic Armor

[*Continued from page* 62]

ing tests with actual fragments, and a spectacular demonstration in the spring of 1944, served to overcome most opposition to the use of the plastic armor.

Two Navy officers of the Bureau of Medicine and Surgery staged the demonstration which popularized the merits of the new armor, in a shack near the Naval Medical Center at Bethesda, Md.

# MAKE MONEY

*Selling*

**FLUORESCENT**

**SAVES 1/2 on Electric Light Bills**

**Just Plug in and Light**

**NO MORE Extra equipment. No more Special Wiring.**

**Screws**

**INTO SOCKET JUST LIKE BULB!**

**SALESMEN!** Once expensive—once costly to install—out of the reach of most people, Fluorescent Lights still sold in millions. Experts now predict war starved market of 3½ BILLION, and with invention of fixture that screws in like an ordinary light bulb, a fixture that can be installed in an instant, a fixture that sells complete with tubes at a new low price—the most spectacular sales opportunity of the decade has been opened up for salesmen and distributors. Enormous advance commissions. Exceptional factory co-operation includes financing big orders, shipping open account, furnish local advertising.

**FREE** If earnings of $5,000, $10,000 and $15,000 a year don't scare you, rush your name by fastest way for sensational facts—sales plans—complete line with pictures and prices. This is the hottest item in direct selling today. Even if you don't answer another ad in this magazine, rush your name on this one—right now.

**North American Mfg. Co., 5042 Cottage Grove, Dept. 55, Chicago 15, Ill.**

## NEW AMAZING BATTERY CHARGER

110-220 volts A.C. Charges up to 30 Batteries. $37.50 complete with bulb, fully guaranteed. START profitable business. RE-CAST junk batteries into NEW! Instructions, everything supplied.

**BATTERY LABORATORIES**

Dept. A — Minneapolis 13, Minn.

*New Designs in*

## FRANZITE GRIPS

**Modernize Your Gun! Improve Your Score!**

Most durable grips made. Positively unbreakable! For Colt, Smith & Wesson, Hi-Standard. Origies, Luger & Mausers in a wide choice of beautiful designs in ivory, pearl, walnut, onyx, etc. Low prices. FREE CATALOG. Dealers Wanted.

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KEEP YOURSELF UP-TO-DATE ON

## WOOD

VENEERS LUMBER & SUPPLIES

*with*

## CONSTANTINE'S MASTER MANUAL

Published by the leading suppliers to woodworkers, the most complete book ever offered. More than a catalog, contains valuable information on lumber inlays, veneers, wood finishing, etc. 83 inlay border designs in full color, 6 pages of full color inlays plus a wood identification chart showing over 60 rare woods in natural color. Send only 25c today and we will include FREE a year's subscription to our publication, Chips & Chats.

**ALBERT CONSTANTINE & SON, INC.**
**1146 E. 138th STREET, NEW YORK 54, N. Y.**

## TWO FAMOUS LINES - NOW BEING MADE IN Nylon

### *The Top in Casting Lines*

World-famed Black-Oreno is back—in Nylon! Hard braided, waterproofed, exceptionally smooth, it's easy to cast and has the great long-lasting quality for which this dependable line is famous. 6 tensile tests: 12, 15, 20, 25 and 30 pound.

### *The Top in Fly Lines*

Excel-Oreno has always been known for long wear and dependable service. Now braided of Nylon, finished with exacting, painstaking care, Excel-Oreno is now your best *investment* in fly lines. Level lines, H to C, in 25-yard coils. Double tapers—HEH, HDH and HCH—30-yard coils.

**LINE-ORENO NYLON IS BACK, TOO!**

This original South Bend Nylon casting line is an unusually serviceable line of exceptionally long life. 12, 15, 20, 25 and 30 pound test.

**FISHING PHOTO BOOK — FREE!**

Send for this 48-page book packed with fishing *action* photos—all prize winners in the South Bend Bait Company Fishing Photo Contest.

**SOUTH BEND BAIT COMPANY**
**890 S. High St., South Bend 23, Indiana**

# SOUTH BEND

*A Name Famous in Fishing*

# 1001 Re-Blade Knife*

with interchangeable surgical steel blades!

KEEN!
EVER SHARP!
EVER READY!

"1001" Knife as above, $1.29
Knife with 3 extra, different blades and honing stone, $1.59

## The first really "balanced" craft knife

Whether you're an expert craftsman or just a passably fair workman or hobbyist, you'll do better work faster and easier with "1001"—the re-blade knife of 1001 uses! For "1001", thanks to its light, perfectly balanced, colorful plastic handle, is second to none for easy and exact whittling, chiseling, modeling and cutting of all sorts. *Its patented, scientifically designed chromium finish blade holder simplifies the insertion and removal of "1001's" all-purpose blades, and keeps them firmly locked in place.* Yourself—get a "1001"—*feel* the difference, *see* the difference in your work. It's as easy to handle as a pen or pencil.

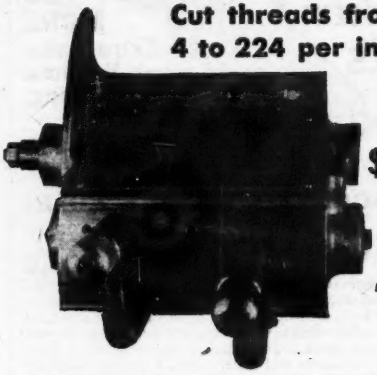
• Buy "1001" wherever hobbycraft tools are sold. If your dealer cannot supply you, send check or money order for $1.29 (or $1.59) direct to

**SOMAR SPECIALTY CORP.**
Dept. M4—630 Fifth Ave., New York 20, N. Y.

*PAT. PENDING

# Quick Change Gear Box for Atlas and Craftsman Lathes

**Cut threads from 4 to 224 per inch**



**Only $75.00**
F.O.B. Chicago

• *Sold on money-back guarantee if not satisfied.*

This gear box is constructed of all-steel gears in aluminum casting with bronze bearings throughout. Easy to install. Full instructions with shipment. Speedy production; maintained accuracy. Easy to set. Prompt delivery.

**THE O'BRIEN MACHINE CO.**
Dept. MI 1620 Highland Ave. Chicago 26, Ill.

## MILL IT ON YOUR LATHE

**PALMGREN MILLING ATTACHMENT**

Now—you can mill, saw at angles, groove, slot, square and many other jobs on your lathe. Fits all lathes by straddling tool post. Graduated feed and adjustment screw, also 360° angle adjustment. No. 150, 1½" Jaw, $18.75. No. 250, 2½" Jaw, $24.75. No. 400, 4" Jaw, $39.75. Order Now! Write for Circular 6349

**CHICAGO TOOL and ENGINEERING CO.**
6349 South Chicago Ave., Chicago 17, Ill.

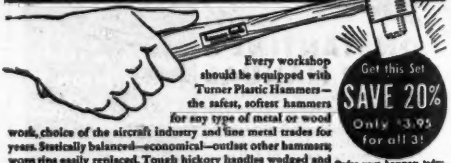
## MOTOR RACING WITH MERCEDES-BENZ

Sensational book of Grand Prix Racing. 176 pages, includes 93 world's finest action race photos. Famous speedways, cars described. See and read about Caracciola, Rosemeyer, Seaman, Von Brauschitsch, Ruesch, Mays, Nuvolari, Fagioli, Chiron, Lang, others. Photos Mercedes-Benz, Auto-Union, Alfa-Romeo, Bugatti, Maserati, E.R.A., others. Graphic, thrilling race incidents. Postpaid, $2.00; De Luxe clothbound, $3.00.

**CLYMER, Dept. ME, 2125 W. Pico, Los Angeles 6, Calif.**

## HOME CRAFTSMEN!

add to your skill with turner PLASTIC HAMMERS



Every workshop should be equipped with Turner Plastic Hammers—the safest, softest hammers for any type of metal or wood work, choice of the aircraft industry and fine metal trades for years. Statically balanced—economical—outlast other hammers; worn tips easily replaced. Tough hickory handles wedged and keyed into solid steel rust-proofed heads. No twist or turn.

Get this Set SAVE 20% Only $3.95 for all 3!

Order your hammers today. Shipped prepaid or C. O. D. plus postage.

MONEY BACK GUARANTEE!

| No. | Length | Head Wt. | Each |
|---|---|---|---|
| 3 | 11" | 4 oz. | $1.15 |
| 7 | 13" | 9 oz. | 1.55 |
| 15 | 13" | 12 oz. | 2.25 |

**turner tools, Dept. MI-5**
8313 SAN FERNANDO ROAD
GLENDALE 4 • CALIFORNIA

## They Fight Fire With Fire

[*Continued from page* 45]

the vault may be sensitive to heat, so that a cutting torch will set the alarm off. The fifth system works on body capacity, and goes off when anyone goes near the vault. Unless you can "blow" a vault by remote control, you're out of luck!

Safes get really tough treatment at the hands of these destruction experts in the labs. The safe has to be proof not only against human thievery but against fire, the thief which may snatch valuable papers beyond chance of recovery. Stuffed with papers, a safe is locked, then put into a furnace where the temperature is 2000° Fahrenheit. And there it stays for an hour. Still sizzling, the safe is hoisted up the equivalent of three stories and is dropped crashing onto a pile of bricks. If it's still all in one piece, papers intact, the safe is considered to have passed the test.

Nor will the criminal have any better luck if he tries a "holdup." Some banks use tear gas bombs, and the criminal can't outsmart them by wearing goggles. U.L. will not approve tear gas that can't drive a man *with* goggles from the room in three seconds. If in a desperate effort the robber fires at the teller's window, his machine gun bullets will rattle harmlessly off its bullet-proof glass and steel, and he will find that guns are now pointing at him from portholes in the walls. There is not one place in the bullet-resisting barrier where a gun or its bullet can penetrate.

## Huff-Duff

[*Continued from page* 47]

work of direction finder stations continually policed the air waves for enemy submarine broadcasts, noted their bearings, and then fixed the position of the prowlers by determining their bearings from several widely-separated shore stations. These fixes were correlated and radioed daily to ships in the Atlantic.

Here's how the system worked: Let's suppose a U-boat operated against Allied shipping in the Atlantic, surfaced at night and sent a report to headquarters at Lorient, France. Such a broadcast was picked up by one of our direction finder stations. The station instantly alerted all other Allied stations, giving the submarine's radio frequency.

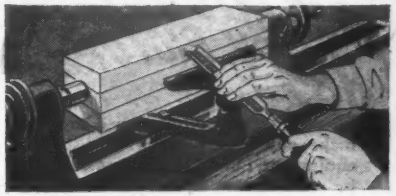
All Navy stations immediately tuned to this frequency and each adjusted its DF receiver for maximum volume. A device attached to the receiver indicated the direction from which the sub's broadcast emanated. This direction, or bearing, was sent at once to a "net control station," which forwarded the information to the Navy's Atlantic Strategic High Frequency DF Net Plotting Center at Washington.

In a matter of minutes a "killer" group of escort carriers and destroyers was on its way to attack. The ships also attempted to get continuing fixes through their own equipment.


# WORKSHOP WISDOM

### Laminating waste stock for turning

MAKE use of your waste stock by laminating scrap pieces with CASCAMITE, because it's *strong, stain-free,* and *highly water-resistant.*



**To laminate waste stock**

Choose pieces of stock to roughly approximate finished size and shape. Plane surfaces to be glued so that they are perfectly smooth. Spread a thin film of CASCAMITE on the surfaces to be glued. Clamp and let set (at 70°F. or warmer) until glue is hard.

CASCAMITE is also recommended for laminating stock for table and chair legs, banisters, deep wooden bowls—wherever large dimensions discourage use of solid stock.

**A "cinch" you'll prefer—CASCAMITE**

**Easy to mix.** Just add CASCAMITE to cold water and stir.

**Strong.** CASCAMITE forms a bond stronger than the wood itself.

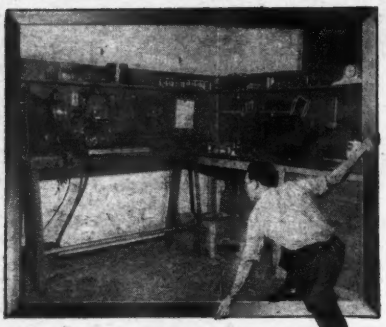
**Thrifty too!** Mix CASCAMITE as you need it. No waste.

Get CASCAMITE urea-resin glue—and CASCO, the standard casein household repair glue, at your hardware store in 10¢, 25¢, and larger sizes. For outdoor and boat work, use CASCOPHEN, the new, completely durable, waterproof resorcinol-resin glue.

**FREE GLUING GUIDE containing complete gluing directions plus helpful hints for household repairs. Free on request. Address a post card to Casein Company of America, Dept. MI-56, 350 Madison Avenue, New York 17, N. Y.**

**CASCAMITE**

***Dry Powder Urea Resin Glue***



# GET INTO THIS HAPPY PICTURE

A well-equipped shop to make and repair home furnishings, equipment, and appliances is the practical dream of many a man. You can have such a shop soon — at low cost — if you standardize on Atlas machine tools.

Atlas equipment is engineered to help you make the most of your mechanical skill, and save hours of time on shop projects. Ask your Atlas dealer to let you know when tools are available. Send for a catalog to help in making your plans.

SEND FOR FREE CATALOG

**ATLAS PRESS CO.**
552 N. PITCHER ST.
KALAMAZOO 13D, MICH.

6"-10" Lathes  Milling Machines  Shapers  Drill Presses

## SHAW "DU-ALL" and "Peppy-Pal" GARDEN TRACTORS

• 1 to 9 H.P. Circulars on request. Building more now—We supply repairs for all SHAW Tractors sold in our 42 years in business.

**BUILD YOUR OWN RIDING TRACTOR—"WAR HORSE"**

using old auto parts, powered by 2 H.P. or larger air-cooled engine; or walking type Garden Tractor ½ to 3 H.P. or convert truck or auto into Farm Tractor. Each with steel or rubber tires; will plow, cultivate. Plans for building, in few hours, any one of above, postpaid for $1.00 (state which wanted) or all 3 for $2.00. Money Back Guarantee!

**SHAW MFG. CO., 2905 Front St.**
Galesburg, Kansas
668ME North 4th St. Columbus, Ohio

## INTRODUCING-New Victory Model HANDIWELD ELECTRIC ARC WELDER

RETAILS ONLY $1.95

FULLY GUARANTEED

**PLUGS into LIGHT SOCKET**

VICTORY Model Handiweld Arc Welder operates from 110 volts, A.C. or D.C. current same as other arc welders higher priced; generates tremendous heat to weld all metals. Not a toy welder that uses carbons, but actually uses standard coated rods — sizes 1/16" and 3/32". Generous quantity of 1/16" and 3/32" rods supplied with the welder. Guaranteed not to burn out. Repairs fenders, auto bodies, radiators, machinery parts, etc. Take Victory Model Handiweld anywhere to job, operate right from light socket. You'll find a thousand uses for this welder around your home, garage, workshop. Also in garages, factories, repair shops, tin shops; mechanics, inventors, plumbers, farmers, etc. Order a "VICTORY MODEL" HANDIWELD today!

**SEND NO MONEY** We'll rush one to you with rods, helmet, operating instructions, and all necessary parts with the exception of a large jar and small piece of extension cord; these most everyone has. Pay postman only $1.95 plus few cents p'st'ge. If not delighted return Victory Model Handiweld in 5 days from receipt and money paid for it will be refunded promptly. Rush your order now.

**KUMFY PRODUCTS, Dept. F-199, Cincinnati 25, Ohio**

## ONLY $9.95—ENGINES IN STOCK

The G.H.Q. miniature gasoline engine that really operates is now available. Over 100,000 sold to date. 1/5 H.P. Complete with coil and condenser and full illustrated instructions for only $9.95. Fully bench tested and ready to run. Power for all models. Send only $1.00. *Shipped Collect C.O.D. same day. Send for free illustrated Catalog of hundreds of plane, boat and hobby items.*

**GHQ MOTORS, Dept. AX56, Box 193, Sta. O, N. Y. 11, N. Y**

**BUY UNITED STATES BONDS & STAMPS**

# PLASTICS

**There's fun and profit in making plastic jewelry, novelties, and furnishings, in your home workshop! We have every material you need—Plexiglas, Lucite, Bakelite, Lignolite, Tenite II, Lumarith, in a large variety of sheets, rods, tubes, and special shapes. Also dyes, cements and other plastics supplies and accessories. Send 10 cents today for complete catalog.**

**CARMEN-BRONSON CO.**
165 East 3rd St., Dept. 5-C, Mt. Vernon, N. Y.

## Drivie-Talkie

[*Continued from page* 49]

express pick-up or for service of any sort, the waiting period for a service truck or car to contact the company office will be eliminated. The company will call the truck over its regular phones and give the driver your address.

Doctors will find this system of inestimable value when out making calls on their patients. Now, an emergency call to a doctor's office may find him out making calls. This means that his nurse must contact all the places he planned to visit, until she locates him and gives him your message. With mobile telephone service she can call his car directly, or in extreme emergency have the call switched to his car.

Behind the scenes there is little more equipment required than the telephone exchanges now possess. Using the telephone lines for transmission of the calls from the mobile-phone central exchanges has reduced the equipment needed. Transmitter-receiver stations will be installed at intervals along highways, connected into the regular exchanges that now exist. Your call from a car or truck will be transmitted from your set by pushing a button, and a switchboard operator will receive a signal indicating you wish to place a call. The mobile transceiver will develop only about 15 watts of power; the interval-spaced receiving units along the highway will relay your signal to the switchboard.

## Sono-Buoy

[*Continued from page* 47]

submarine menace might become too much for the Allies. During 1942, Allied shipping was destroyed at the rate of 16,000 tons a day by lurking Nazi subs.

This briefly, then, is the story of radar as an anti-submarine weapon. But the true story of anti-submarine warfare would not be complete without telling of the role the Sono-buoy played in detecting and ferreting out submerged U-boats.

The Sono-buoys are dropped by aircraft on the water. When these instruments hit the water stringed hydraphones which rotate detatch themselves from the buoys and drop several feet underneath the surface. These listening devices pick up all underwater sounds quickly and differentiate regular underwater noises and currents from the irregular sounds of throbbing Diesel engines, and water hitting against the sides of U-boats. The hydraphones change these sound impressions to small voltages which are amplified and converted into radio waves in the transmitter part of the buoys. The airplane carrying a special receiver turned to the same frequency of the buoy transmitters receive these radio waves which reveal to the occupants of the plane whether or not a sub is lurking on the bottom of the water and indicates exactly where the sub is hiding.

***Marlin brings to sportsmen, through this series of advertisements, interesting facts on gun-making—to enhance appreciation of fine sporting firearms and to encourage their thoughtful handling and care.***

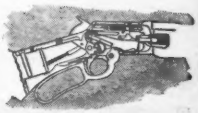
**RIFLE'S HEART** • Inventive genius and fine craftsmanship mark firearms actions which have stood the test of time. The action is the main "works" of the rifle. Mechanism which carries cartridge from magazine to chamber...locks action... strikes firing-pin...pulls out and ejects cartridge ...is so compact that it fits into a man's hand. All working parts are heat-treated for lifetime wear. Assembling is entrusted only to craftsmen of great experience and skill. All actions are tested before shipment.

*Assembling action of the Marlin 39-A Rifle.*

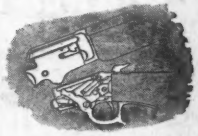
*Testing actions at Marlin Firearms Plant.*

**SOLID TOP RECEIVER** • A major advance in firearms design and the invention of J. M. Marlin. Solid top permits lowest possible mounting of telescope sight. Cartridge cases are ejected *at side, cannot* fly in shooter's face.

**AT RIGHT** are shown the "insides" of the Marlin 39-A Rifle. Its famous action has been continuously improved over half a century. Note solid top receiver, simplicity of mechanism.



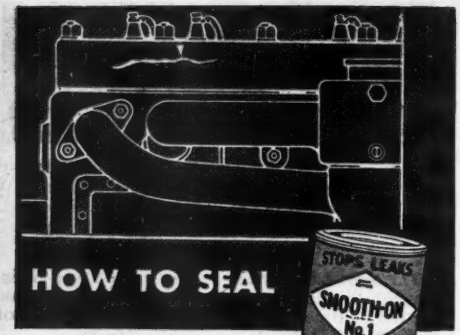
**ALL WORKING PARTS** of Marlin's 39-A are exposed for cleaning and oiling by turning a single take-down screw. This Marlin is the only lever-action, .22 cal. repeating rifle made.



*(The next advertisement in this Marlin series will reveal more interesting facts on fine gun-making.)*

THE **Marlin** FIREARMS CO.
NEW HAVEN, CONNECTICUT, U. S. A.

BE SURE TO SEE MARLIN 1946 MODELS ON DISPLAY AT YOUR DEALER'S

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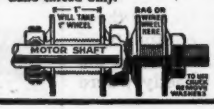
A combination drilling or grinding wheel attachment. For ½" motor shafts. Will take grinding wheel with 1" hole on shaft and ½" hole on small end. Extension can be used for rag or wire wheel, or ½", 24-thread drill chuck which holds drills from No. 60 to ¼" in diameter. Right hand thread only. Price Only $1.50

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Los Angeles 44, Calif.

## The Rocket

[*Continued from page 67*]

pleasure. The brakes are a novel feature in that they are not the usual strip-type bands and drum, but consist simply of pads, one to a wheel, that are forced out against discs on the wheel by hydraulic pressure from the pedal cylinders. Out in the open, you'd imagine that mud and dirt would make them inoperative in wet weather, but such is not the case. The secret is the fact that the discs are highly polished and chrome-plated and the pads have a wiping action as they work. Service is simple and replacement is a mechanic's dream—three bolts to remove, a new pad slipped in and new brakes are in place. Turn the bolt in or out, lock it in place and brakes are adjusted.

In appearance, the ship sells itself—just as cars are expected to do on showroom floors, and where car salesmen quote "60 in second"—the Rocket salesmen can quote a climb of 2,000 feet per minute, 185 mph top speed, landing speed an honest 50 and one thing you haven't seen yet in a personal plane—a gas capacity of 56 gallons that gives the ship a range of close to a thousand miles, twice that of the average light plane. It weighs close to 2,500 pounds, feels like a larger plane, yet handles like a personal plane should, without tricks or sensitivity. At the estimated $5,000 fly-away price at Fort Worth, Texas, this ship should sell like the proverbial hotcakes at breakfast time.

## Radar Sees 'Em In

[*Continued from page 70*]

time pilot, caught above a "closed-in" airport without much gas, has been "talked down" to a runway and a safe landing by a ground radio operator who judged where he was by the sound of his engine. Telling the pilot he was north of the field, should swing around and throttle back, settle for a landing and so forth frequently worked—but the difficulty has always been that fog plays peculiar tricks with sound, so that sometimes a ship would crack up because the sound of its engines was deviated by the moisture in the air, confusing the ground radio operator.

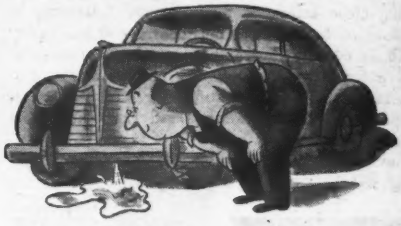
The operator now has radar for eyes, with the viewplates in front of him scaled off in miles and feet. He can tell the pilot within plus or minus a few feet where his plane is in all three dimensions.

RLC operators have often done just this. In one instance during the latter days of the war a Colonel Grey, C.O. of a squadron, was caught over his home airport in a sudden close-in of the weather. With the Control operator guiding him in, he landed perfectly on the runway, *but then couldn't find the proper taxi strip to the hangar,* the fog was so thick. The tower controller had to send out a jeep to convoy the colonel in.

Thousands of landings under extreme emergency conditions have proven this device beyond all doubt.


GET READY FOR SPRING

**1. CLEAN RUST OUT OF YOUR RADIATOR**



**with DU PONT Cooling System CLEANSER**

Drain out your anti-freeze, and clean out winter's accumulation of scum, scale and rust. Neglect now may mean trouble and costly repairs later. Just pour a can of DU PONT COOLING SYSTEM CLEANSER into your radiator, run the engine 30 minutes or more, and drain.

**2. MAKE IT RUST-PROOF**

**with DU PONT Acid and Rust INHIBITOR**

After cleaning out the radiator, you can keep it free from rust all season by pouring in a can of DU PONT ACID AND RUST INHIBITOR. It prevents rust forming, and keeps out acid, too.

**3. MAKE IT LEAK-PROOF**

**with DUPONT Cooling System SEALER**

You can stop leaks quickly and securely—and make the cooling system LEAK-PROOF—by pouring in DU PONT COOLING SYSTEM SEALER. It will not clog the radiator.

**MAKE YOUR CAR LOOK NEW**

**with DU PONT NO. 7 POLISH**

Clean away dull traffic film—restore the original lustre and beauty of the finish. A little rubbing with No. 7 Polish will make a wonderful improvement in the car's appearance. It's quick, easy and safe.

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A fine precision tool, the 9-inch South Bend Lathe is well known in the metal working industries for its exacting, close tolerance performance. Adaptable to all classes of toolroom, experimental and laboratory work, it is equally desirable in production machine shops, automotive and aviation service shops, and maintenance shops. Because of its versatility, accuracy, and speed, the 9-inch South Bend Lathe is highly efficient on all types of machine work. Write for Catalog 100-D.

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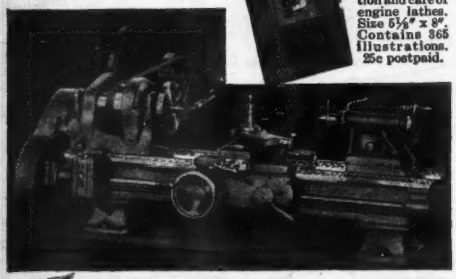
128 page book on the operation and care of engine lathes. Size 5⅛" x 8". Contains 365 illustrations. 25c postpaid.



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PACKS EXTRA POUNDS OF POWER!

***See! Try This Amazing Tool!***

Frozen, rusted-over screws are no problem for Tuffy Power-Arm Driver! Tuffy's terrific leverage loosens them easily and quickly in a jiffy. And for tightening screws "that last quarter-turn" Tuffy's power will amaze you! Then snap Power-Arm shut and presto!... a regulation screw driver. See yourself how Tuffy greatly increases turning power over "one-handed" driving.

Durable aluminum handle, forged steel blade plated to ward off rust. Available in 3 sizes: 5 inch blade $1.95, 6 inch blade $2.25, 8 inch blade $2.65. Complete set of all 3 sizes packaged in kit box, $6.85. If your dealer can't supply you, send us his name.

With Power-Arm Folded Back Tuffy Becomes Regulation Screw Driver

Set of 3 popular sizes only $6.85. Order TODAY

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THE only one-motion stainless steel lighter at $1.00. New wheel and flint adjustment for velvet-smooth action.

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Send Free Plan on Saw Filing business, no obligation

Name _____

Address _____


## "Blind" Trainer

[*Continued from page* 96]

"seal" him into the windowless cabin, and then, while the mock-up pitches and tosses in simulation of an actual plane, the pilot tries to fly his "ship" by watching the instruments on the mock-up's dashboard.

In contrast to these necessarily elaborate devices is the incredibly simple "view limiter" method developed by an engineer in the Training Aids Division of the Equipment Laboratory at Wright Field. Puttering around one day with some colored glass, he found that if you held a piece of blue glass in front of a piece of orange glass, the colors would neutralize each other so that when you looked through both pieces at the same time all you saw was a field of jet black. It didn't take him long to figure out how this could be used to train pilots in blind flying. All that had to be done was to fit a dual-control ship with an orange-colored windshield and have an instructor sit at one set of controls while the blue-goggled trainee sat at the other. The only difference would be that the instructor would be able to see everything as usual while the view of the trainee would be limited to the interior of the plane.

Aside from its almost unbelievable simplicity, this new type of training possesses an extremely important psychological value. In a laboratory mock-up, the trainee knows that there is no risk involved.

In the view-limiter method, the psychology of the trainee is entirely different. Although he realizes that at his elbow is an instructor who will soon enough take over the controls should he get into serious trouble, what he is most concerned with is that he is actually flying an honest-to-God ship. The result, and herein lies the most important feature of the new method, is that from the very first moment of his schooling, the pilot is being trained to think and act under a tension that is bound to be present whenever he takes a ship into the air "blind."

## The Roosevelt Dime

[*Continued from page* 51]

coining press. The blank is held firmly by a collar as it is struck under pressure varying from 40 tons for one cent pieces and dimes, to 170 tons for silver dollars. Upper and lower dies impress the design on both sides of the coin at the same time. In the case of silver coins, the inside of the collar holding the blank is grooved. The pressure forces the metal into the grooves of the collar, imparting the "reeding" on the finished coin. This reeding makes it impossible for the coin to be shaved without detection.

The metal and alloy content of coins is fixed by Congress and has varied from time to time. Today a dime weighs 38.58 grains and consists of 90 per cent silver and 10 per cent copper.

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ELECTRIC DREMEL POWER TOOLS

## PUT THIS "WAR VETERAN" TO WORK

Approximately 27,000 R.P.M.

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A Model 2 Moto-Tool develops a speed of approximately 27,000 r.p.m. Weighs only 13 oz. Shaped to fit the hand. Sturdily built with shock-proof bakelite housing. Balanced for vibrationless operation. Uses 110-120 AC or DC current.

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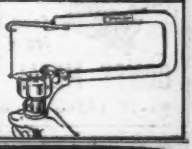
### WATCH FOR THE RETURN OF MOTO-SAW



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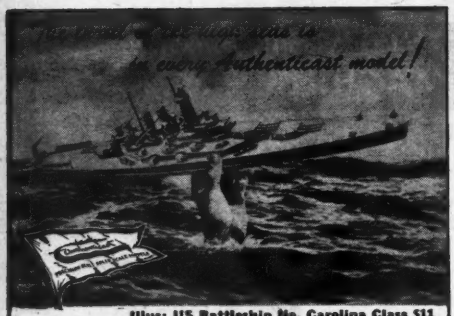


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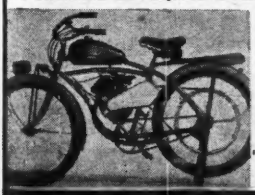

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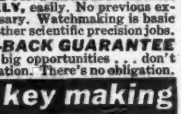

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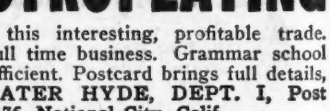

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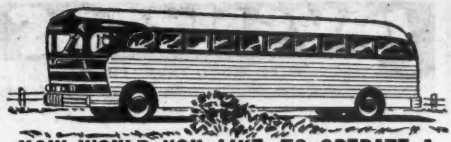

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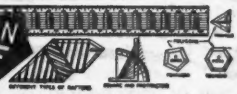

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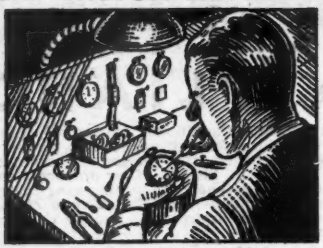

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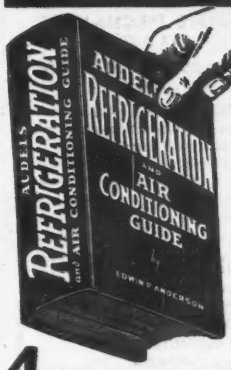


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